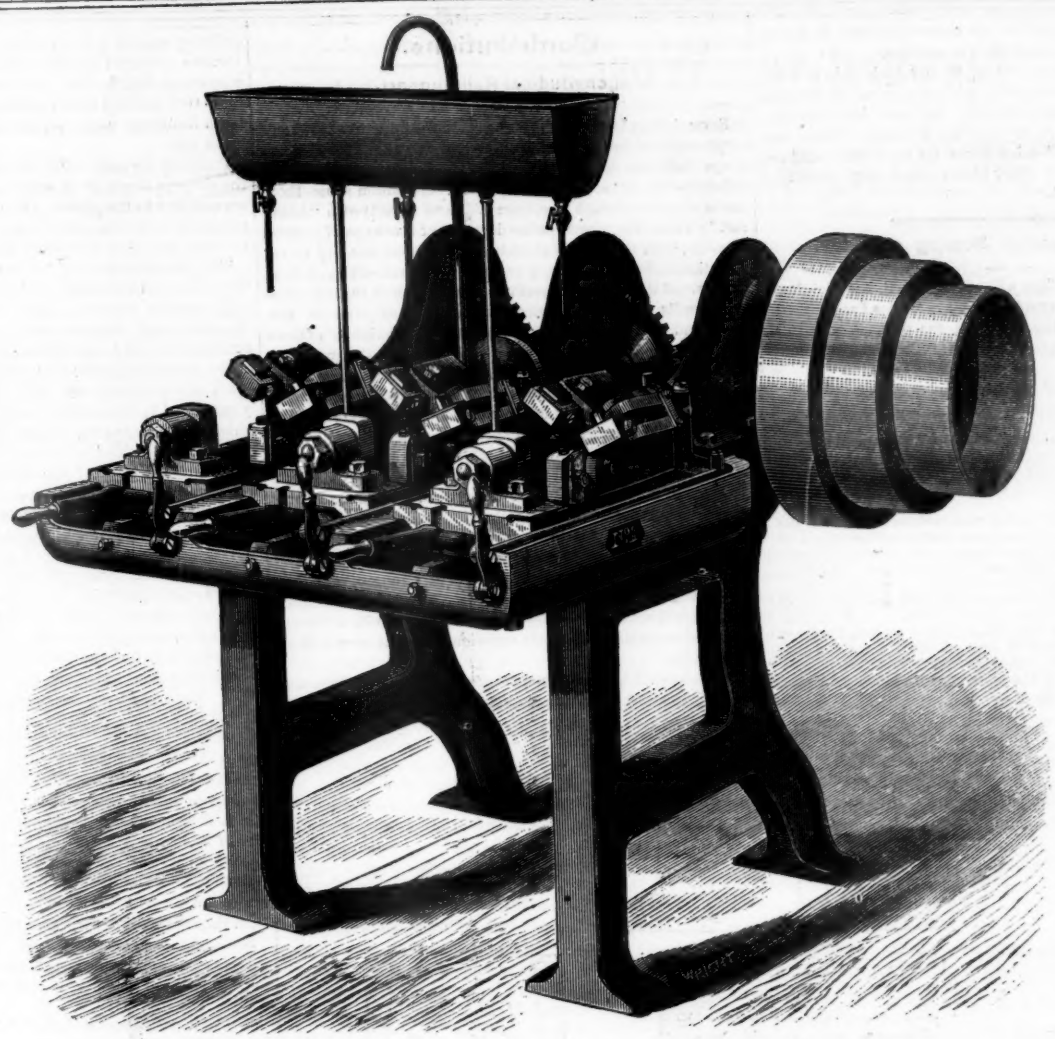
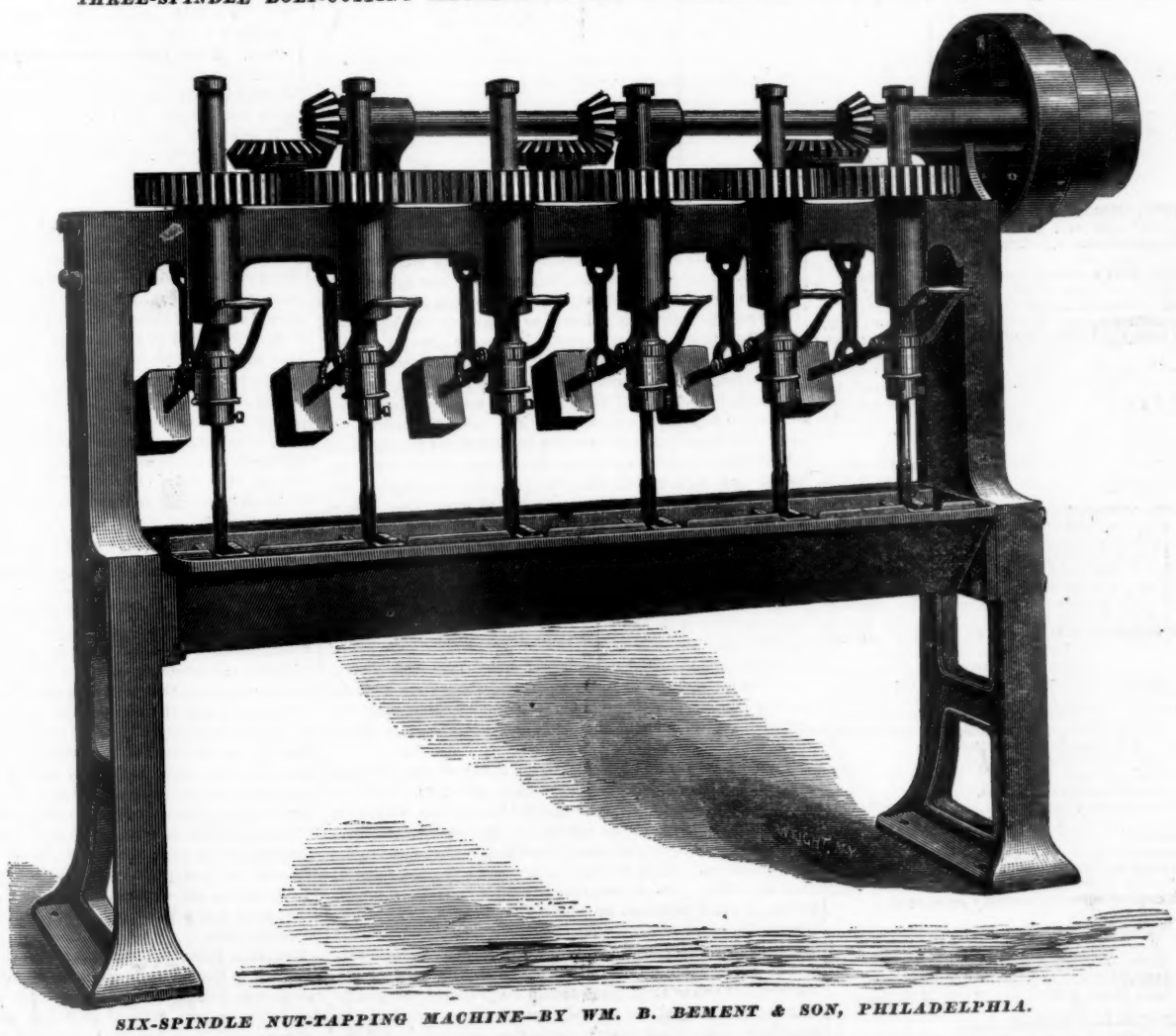


THREE-SPINDLE BOLT-CUTTING MACHINE—BY WM. B. BEMENT & SON, PHILADELPHIA.



SIX-SPINDLE NUT-TAPPING MACHINE—BY WM. B. BEMENT & SON, PHILADELPHIA.

Bolt-Cutting and Nut-Tapping Machines.

The engravings given represent two improved machines which have just been designed and constructed by the well-known firm of Wm. B. Bement & Son, of Philadelphia. They are intended for use when large quantities of bolts and nuts must be supplied. The general construction of these machines is obvious from the engravings.

The bolt machine will cut three one-inch bolts at once. The dies are arranged so as to revolve and open automatically or by hand, allowing the bolts to be withdrawn without loss of time, and without reversing or stopping the machine. This is done by a very ingenious arrangement of the dies, which can only be understood by an examination of the machine, or from much more elaborate engravings than we are able to give. Oil

is fed by an automatic pump to the reservoir shown in the engraving, from which it is conducted to the dies.

The nut-tapping machine will tap six one-inch nuts at once. The spindles are counterweighted, and the taps can be inserted or removed from the spindles while the latter are in motion. The nuts are immersed in oil while being tapped. These machines seem to have great advantages for rapid work, and are intended for car shops and other places where large quantities of bolts and nuts are used.

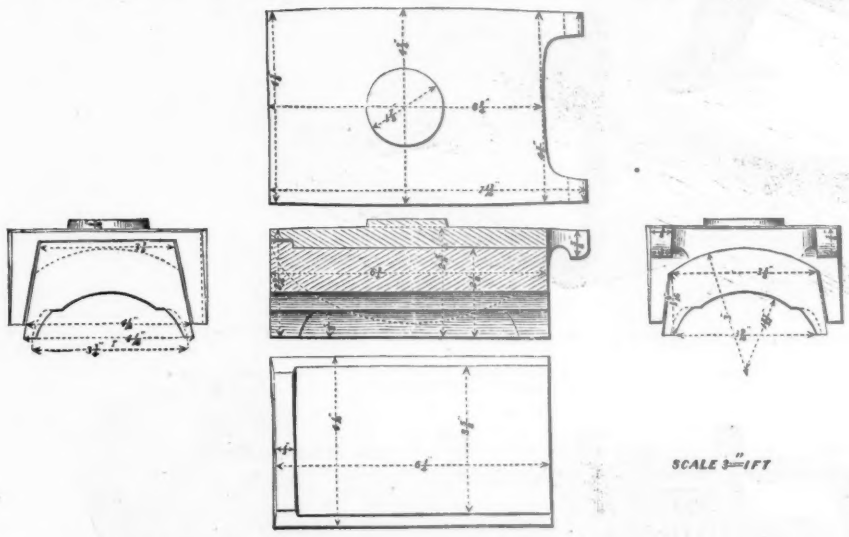
Standard Car-Journal Bearing and Key.

The following report, which will explain itself, has just been issued by the Committee appointed by the Master Car-Builders' Association. The engraving below is the pattern of journal bearing and key recommended for general adoption by the Committee:

To the Master Car-Builders' Association:

GENTLEMEN: Your Committee, appointed at the last annual convention of the Association, held in the city of St. Louis, and to which was assigned the duty of collecting information in regard to railway axles, oil-boxes and journal-bearings, with the view of determining the most suitable form and size of the same to be adopted as a uniform standard by all railroads, beg leave respectfully to report:

That for the purpose of obtaining such information from the most reliable sources, your Committee have sent circulars as far as practicable to all master car-builders and master mechanics connected with the car departments of railroads, and have received replies from the majority of those to whom such circulars were sent, accompanied in some cases with descriptions of practical tests made of different sized journals, and recommending the adoption of a larger journal and oil-box than are now generally used: although in some of the replies the size and kind of oil-box used by the roads with which the parties are connected are given with the statement that they were satisfactory. It is to be remarked, however, that all the reports



received from parties connected with the large trunk lines favor an increased size of axle and journal-box, while the reports which favor the present size are from parties connected with smaller roads.

Your Committee, after a careful investigation of the subject, have arrived at the conclusion that a larger axle, a longer and larger journal, and of course larger oil-boxes, are desirable. In coming to this conclusion, they have given greater heed to the reports received from the leading trunk lines of road throughout the country, for the reason that such lines use a much larger number and a greater variety of cars than the smaller and branch lines, and therefore the observation and experience of those who have charge of the car repairs on the long lines have more value than those of master car-builders whose opportunities of comparing their own cars with those of other roads are necessarily more limited.

Your Committee are of opinion that an increase in the size of the parts named would be a very great advantage to all roads, and this in a great variety of ways. A large axle would tend to lessen its liability to break; an increase in the length and diameter of journals would distribute the friction over a larger surface, facilitate the lubrication, and avoid delays by hot boxes —a source of very frequent annoyance and trouble. A uniform system, once adopted and adhered to by every road, would diminish the aggregate cost of repairs very materially. Other arguments in favor of a standard system might be urged by your Committee, but the leading points above indicated will, in our judgment, be sufficient to convince all practical railroad men of the great benefit to be derived from its adoption.

Guided by the best information to be obtained from the most experienced and practical railway mechanics of the country, your committee would therefore recommend, and strongly urge the Association to adopt, the following specified sizes of journals and axles for all new work, both for passenger and freight service, and also for old cars as far as practicable:

Length of axle, between outside collars, 6ft. 10in.
Thickness of collars, ⅝ inch.
Diameter of axle at wheel-seat, 4½ inches.
Diameter of axle at center, 4 inches.
Length of journal, 7 inches.
Diameter of journal, 3½ inches.

We would also recommend an oil-box with a uniform journal-bearing and key as represented in the accompanying cut, making one uniform core-box for all trucks, whether iron or wood, with jaw or without. All of which is respectfully submitted.

F. D. ADAMS,
Boston & Albany Railroad.
D. HOIT.
Toledo, Wabash & Western Railway.
JOHN KIRBY,
Lake Shore & Michigan Southern Railway.

Broken Rails.

The Springfield (Mass.) *Republican* says:

"The master of the section of the Boston & Albany Railroad between Westfield and Salmon Falls, says it has been his recent experience to find seven or eight broken rails nearly every day."

Contributions.

Longitudinal Rail Support.

Several years ago, when lighter rails were in use than is the rule at present and breakages were frequent, it was supposed that a proper addition to the weight of rail would insure safety in this respect. In accordance with this supposition some thousands of miles of track have been laid (and relaid) with "heavy rail." There was a perceptible decrease of breakage of rails on some lines on the adoption of heavy rails, but, contary to expectation, it did not generally prove a specific remedy; and these are some of the reasons therefor: First, the rails turned out of some mills, though heavier, were made of inferior material and were no stronger than those of a lighter pattern made of a good quality of iron or steel. Second, the weight of rolling stock was proportionately increased (and on some lines even more), so that the failures were as frequent as with the lighter rail. Third, some enconomizing (?) managers argued that as they had incurred the expense of a heavier rail, fewer cross-ties would give ample support to it, so that what additional strength was gained by extra weight of rail was lost by a reduction of the number of cross-ties ordinarily used for lighter rail. In this manner not a few railroad companies have gone to the bottom of their till to improve their permanent way and put it in a condition of greater safety and durability, and though their rail is heavier their track is no stronger, and they have not accomplished their purpose. And even those lines that are laid with the heaviest rails in use and with a liberal support of cross-ties frequently experience serious trouble from broken rails.

There seems to be no method to effectually prevent this but by giving the rail a continuous longitudinal support. Several methods have been proposed for this purpose, but none of them seem to possess sufficient merit to attract the attention of railroad managers so far as to give them a serious consideration. Indeed it is not an easy matter to say exactly how this can best be accomplished, but there is scarcely room for a doubt of its being effectually accomplished so soon as it may be decided that longitudinal support is preferable to the present plan of using cross-ties only. I say "only," for it is obviously impossible to prepare an efficient rail support without in some manner using cross-ties, and when *only* these are used the rail has an uneven and uncertain support. For, notwithstanding the severe tests to which rails are now subjected and the care with which they are selected (by some purchasers), more or less unsound rails mysteriously find their way into the track. And if a defective spot in a rail occupies one of those long spaces between the ties, too frequently made by a tie being left out, or occasioned by being improperly spaced by the track-layers, there is a strong probability of a disaster in that locality. Last winter there were four broken rails reported on one road (a new one), and every break occurred where the ties were laid too far apart, or where a tie had been left out. The report does not state whether the rails were defective or not, but even sound rails cannot be expected to withstand such usage, and for the lack of a tie costing 30 or 40 cents, and about one cent for placing it, and about 10 cents for spikes and spiking, making a grand total of 51 cents at outside figures, there is a loss of life, limb and property amounting to thousands of dollars.

Although the present plan of relying solely on cross sleepers for rail support is objectionable on many accounts, it will not be an easy matter to persuade railroad men to look with favor upon any other method, on account of the convenience and readiness with which track may be laid and repaired under the present system. But if it can be once proved, beyond a doubt, that any other plan is preferable in all the most essential points, it would doubtless be adopted on most lines as fast as renewal became necessary. This, however, can never be done without experiment, and any railroad company can lay a section of five or six miles for this purpose with little or no extra expense. If two or three plans should be proposed, the merits seeming nearly equal, the several plans may be tested at the same time, and the one nearest perfection may be adopted for the whole line.

I would most respectfully submit the following plan of rail support for the consideration of all liberal-minded railroad men who are not averse to taking hold of what may seem good. A certain class of economists, of course, will "not apply." It would seem a good arrangement to lay cross sleepers in the ordinary manner (except with a little more care) and place thereon stringers or rail plates, say 8 by 12 inches, and of any convenient length, but "breaking joints" with the rail. The cross ties and rail plates should be of sawed or very nicely hewn timber, to insure a perfect bearing of the plate on the cross ties.

Probably the most officient manner of securing the plates to the sleepers would be to spike cast-iron brackets to the sleepers and also to the plates. On very sharp curves it might be necessary to use shorter plates than on straight lines in order to bring the rail in the center of the plate.

With this arrangement the sleepers could be entirely covered with ballast, which would render them far more durable than if only partially covered. Most kinds of timbers suitable for sleepers would remain sound more than twice the length of time they do laid in the ordinary way. They would be relieved of the destroying influences of the weather and the rotting effect of contact with the rail. The sleepers, being more firmly embodied in the road-bed, would hold the rail in perfect line, which is of the greatest importance. It would be less liable to be disturbed by frost, and a more perfect drainage might be secured. If the ends of the plates were placed in contact, it would effectually prevent creeping of rails, which is a serious evil. It appears that rails expand from the middle toward each end, and by using rail-plates the middle of the rail can be made immovable, which, with a proper space between the rails at the joints, would effectually prevent creeping. Railroad men generally do not fully realize the damaging effect of creeping rails, but it is a source of much trouble and expense, by reason of the displacement of joints which it causes, and any reasonable expenditure that will secure a remedy for this evil may well be considered a good investment.

The "train accidents" as reported in the RAILROAD GAZETTE gives, in the month of December, 1872, 18 broken rails, and in the month of January, 1873, produced 41 broken rails that were reported. It is highly probable that the actual number of breakages in January would not fall short of fifty. It is next to impossible to get a *full* report of accidents, from the fact that some managers will not injure the business or reputation of their roads by allowing a report of any *avoidable* accident to go abroad, and many cases do not result in accidents to trains. Several rails were broken in the months above mentioned (as the writer can attest), but as nothing serious resulted from these breakages they were not reported.

Some of the rails broken were new and some were of heavy pattern of steel of improved (?) manufacture; but it is of little importance what manner of rails are used so long as they are not properly supported.

It is lamentable that so little is known of the conditions under which these rails were broken. A close investigation into the causes of these breakages and an elaborate report in each case, or so far as facts could be ascertained, would be valuable.

Measures could then be taken to prevent like disasters in the future. If the railroad community would take an interest in common in this matter and report all cases, causes and results of breakages to the Railway Association of America, very much good would come out of it.

It seems an utter impossibility to procure "honest" rails from any manufactory, which, together with the common slip-shod manner of laying cross-ties, renders a more efficient rail support a necessity. In view of these facts it would seem advisable for railroad managers to turn their attention to testing the merits of "longitudinal track-stringers." Running brass-trimmed locomotives and $30,000 palace cars at high rates of speed on track deficient in all the essentials of permanent way is an absurdity peculiarly American, and it is time the practice should cease. If there is one thing more than another in which perfection should be aimed at in railroad practice, it is permanent way. Not only would it effectually prevent accidents from broken rails, but broken wheels, axles and other portions of rolling stock would be rare occurrences as compared to the present. And as the length of time rolling stock can do duty without undergoing repairs is chiefly owing to the condition of the track, it is a matter of economy to keep it in good order on that account alone. In railroad construction and maintenance it should be remembered that "a chain is no stronger than its weakest link."

WM. S. HUNTINGTON.

Flat Wheels and their Effect on Track.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of February 8 is an article on "Economy in Track Repairs," in which there are many good suggestions. I think you err, however, when you say, "There can be no question, for example, that the breakage of rails is due chiefly to a deficiency of material to resist the strains imposed upon them and to the inferior quality of the metal of which they are made.' There is no doubt that the above is the cause of breakage of rails in some cases, but by no means in a majority of cases. Take any leading Western railroad which keeps its rolling stock in good average repair, and an observant man, if he will closely watch the immense number of trains over such a line, will find one or more flat wheels under about every tenth or fifteenth car, and probably a still larger proportion of flat wheels under the engines. These flat spots in the wheels range from 2 to 8 inches in length on cars and sometimes more on engine tires.

Now take these flat wheels, making 200 revolutions per minute with the flat-spots making steam-hammer-blows on the rail at each revolution, is it any wonder we have broken rails, even when we have rails of sufficient strength to stand any ordinary test? Your idea that rails should be tested as to their tensile and transverse strength is all right enough, but if car and engine wheels were subjected to a different test from what is usually applied, it would pay as well as the rail test. About the only test put upon car wheels is by a pounding process on the sides of the wheels, to see how much it takes to break the wheel, while the surface of the wheel receives but little atten-

tion, and many wheels are used that are full of blisters under the "chilled" surface. These blisters, which in size are all the way from one-half to two inches in diameter, and generally to the depth of the chill, scale off the first 100 miles the car runs, thus leaving a wheel that will do more damage to the rail it runs over, every 100 miles it runs, than the first cost of the wheel. It would be easy enough to test the surface or tread of these wheels by the use of a hammer, and when blisters are found the wheels should be rejected, because the blistered spot soon becomes flat, and not only damages the rail but shakes the whole car so as soon to do as much damage to the car as the price of a good wheel. Especially should flat or blistered wheels be taken out and kept out from under passenger cars. Who that has traveled much on railways has not experienced that most disagreeable of feelings caused by the motion of a car—a kind of trembling motion, without any great movement of the car, and where the track is apparently smooth! Yet the passenger is subjected to the most unpleasant kind of a chilling shake, which he cannot account for. The conductor or any other experienced railroad man could tell him that it is caused by a flat wheel.

Our Western roads are flooded with "foreign cars," which leave their home roads in the East in ordinary repair, but which, by the time they arrive at Chicago or St. Louis, have probably flat wheels. Each road they run over concludes that the car is not in immediate danger of falling to pieces and can be got over their road. So they send it on and transfer it to the next connecting line, which is of the same opinion as the former and so sends the car on. Each line declines putting a new wheel under the car, and when it arrives at its destination it is unloaded and reloaded with return freight for its home road or some other point, and sent along in as bad condition as when received. Finally it gets back home, but its wheels are frequently octagonal instead of round. It is the falsest of false economy to *wear out* wheels. They should be taken out as soon as found to be defective.

TRACK.

The Railway Association of America.

TO THE EDITOR OF THE RAILROAD GAZETTE:

For a long time past your GAZETTE has paid me its welcome weekly visit, while from its pages has unvaryingly beamed a desire to elevate the tone, dignity and intelligence of the railroad profession. Emboldened by your course in the past, I crave space for a few words to the members of the Railway Association of America.

The possible value of such an Association is realized by a large proportion of our managers, yet there is the danger inherent in all such ventures that after the enthusiasm of the originators has worked itself off there may be none found to carry out the design. Railroad management has not yet progressed altogether beyond the chaotic state. There is ample room for improvement; yet little improvement can be looked for unless the experience of the many be availed of to guide the action of the individual. The failures of others must be marked, their causes ascertained and shunned; while the successes are imitated and perpetuated, and the road to success so blazed that none but the blind can stray. One of the first steps necessary for us to take is the

ENCOURAGEMENT THEORY.

In the din and bustle consequent on getting our huge machine in motion, we have hitherto not had time to study the effects of the machine and the advantages of a more skillful management of it. Certain sophisms and ideas have been accepted as principles, without test. Nearly every step that has been taken in advance has been taken with "shut eyes and hopeful heart," or after it has been demonstrated necessary in the hard, blundering and costly school of experience.

The causes producing this state are various—some, perhaps, not immediately obvious to us and altogether too deep for my understanding. The practical man and the scientific man have always been jealous of each other and have aided each other in a way the reverse of cordial. Each possesses a talent that the other has not, and each is very much inclined to undervalue the talent of the other. Abundant examples prove redundantly that the great prizes of commerce are always won by *superior knowledge* under the guidance of *practical skill*. Applied science has transfigured the world. It has come to the aid of suffering humanity; it has relieved the severity of human toil, multiplied domestic comforts and increased the means of refined enjoyment. One example is familiar to us all of how what was long considered the valueless discovery of abstruse scholarship now is an important agent in one of our mightiest industries. The *spectroscope* in the manufacture of Bessemer steel enables a common workman to note the moment of highest excellence. A mistake of a few seconds ruins the product. Without the spectroscope no dependence could be placed on the most experienced and critical eye. Yet for long the spectroscope was looked upon as a pretty but useless toy. There is scarcely any branch of applied science which is not of use to the railroad manager in some one of his many departments. It is necessary, therefore, for the manager to encourage among his employees the habits of speculation and theorizing; to provide places and facilities for the men of scientific turn, as well as for those of practical ability. Habits of thought and speculation, however useful in discovering the methods of applying to the greatest advantage the mechanical forces of nature, are no less necessary to discover the best methods of applying the human forces—of controlling men and of making a proper division of labor.

We hear constantly complaints from superintendents and presidents that their official duties give them no leisure for the study of the subjects upon which they are asked to report. This is all wrong: It is owing to a want of system. The division of labor, so as to produce the highest results, requires careful thought. Careful thought is not to be had in the midst of active duties. Many of our managers hitherto have tried to do too much. They have attempted to arrange all details themselves, and of course have failed to do half of what they intended, and have not done near as much as they flatter themselves they have accomplished. While fondly imagining that they have saved thousands of dollars by careful cheeseparing in some particular direction, they have squandered hundreds of thousands in another direction, either not knowing the loss, or putting it down to the account of those things that are inevitable. The active management of a railroad can be divided into many departments, each affording ample scope for a specialist. The manager at the head should be a man of comparative leisure, thinking out and deciding principles, leaving his specialist assistants to arrange the details. He, seated aloft, calmly surveys the field and detects every false step. But what can be expected from the man who is always too busy to give any one subject thoroughand exhaustive consideration? Man's powers are limited, though he does not always know it. It is natural for him to think that he can do anything and everything better than any other man. Possibly there are men who deserve to be called epitomes of mankind; but if so, there are not enough of them to change our opinion that man's powers are very limited, and that reason must be brought in to educate and restrain our natural tendency to egotism. If in these matters the reasoning faculties of railroad men are sluggish, there are not wanting some outside influences to awake us to our real state, and those influences, hitherto feeble, are gradually swelling like the stream—a tiny brooklet so quiet at its source, a cataract but a few miles farther on. The best essays on the principles which should guide railroad policy and management have come from one not in the profession. There has been no attempt (at least none that I can find after diligent search) on the part of railroad men to discuss these matters. The knowledge and the ability must be there, but the habit of committing the ideas to paper in logical sequence has not been indulged in, probably because there was no demand. The Massachusetts Commissioners, in their third report, sarcastically referred to this. "Whenever they have attempted any step in advance, as a result of their investigations, they have been met with a statement of some of these elementary propositions put forward as if they were recent discoveries. It is very desirable that the discussion should make some progress, and to this end the Railroad Commissioners desire once for all to concede, in the fullest manner, both the training and the experience of the railroad officials and their position as trustees." Let us remember, also, that while we have promedaded in kid gloves and plug hats with our noses high in air, those whom some of us have affected to despise as the uncouth, the uneducated, the horny-handed, have developed a power of organizing and an ability to discuss questions of management, and an enthusiasm for progress and reform, that may well put us to the blush.

SOCIAL INTERCOURSE

might be increased and fostered by our Association. It would bring about a feeling of confidence in one another that is now sadly wanting. This social intercourse would lead to the discovery by many of us that some of those whom we have been accustomed to look upon as enemies, capable of even more meanness than we are ourselves, are after all gentlemen. Such discoveries would lead to above-board, honorable competition, and the establishment of

A STANDARD OF HONOR.

If this be set up, the Association will have accomplished enough to entitle it to the gratitude and support of all right-minded men, and of all persons pecuniarily interested in railroads. Railroads cannot be worked to the best advantage, either for the public or for the shareholders, unless the agreements come to between their managers are rigidly observed. Hitherto agreements have been broken almost as soon as made, and it has been difficult to fix the blame on any individual. Assertions and recriminations are made, but as there is no court of appeal, there is no redress, and the general want of confidence that necessarily ensued has induced a reckless competition. This Association should constitute a high court of appeal; a standing committee of it should have authority to institute searching inquiry and to brand with professional infamy the person who, without sufficient reason, fails to carry out his engagement. By such means it may be that in time the condemnation of the Association shall be but the prelude to the expulsion of the offender from all places of trust. Until some such power is brought to bear, unanimity of action can never be expected. I know of no method by which such a power can be created other than the formation of an Association such as ours. We must endeavor to excite a professional esprit, and not let it be mistaken for or confounded with individual vanity. We want

A SPIRIT OF GENEROUS EMULATION,

not jealous rivalry. These sentiments can be nourished by frequent social intercourse only. Competition has utterly failed to promote the public interests, while it has never failed to impoverish the companies engaged in it. The Massachusetts Commissioners, in their first report, tell us "everything connected with railroads in Massachusetts has always been managed in the most expensive because in the most disconnected manner." This, said of Massachusetts, is probably true of the Union at large. The demands of the hour are greater facilities of transportation, lowest rates and maximum safety possible. Economy and increased efficiency can never be attained unless there is harmony between the different parts of the great system.

MUSEUM OF INVENTIONS.

The Association should have rooms centrally located (St. Louis would probably do as well as any other place), wherein models of inventions and approved apparatus might be kept for inspection of members. At present a superintendent wishing to post himself in matters of that nature has no such help. A standing committee might examine and test the inventions and report at each meeting what ones worthy of adoption had been brought to their notice during the recess.

A LIBRARY

should also be located in the same rooms, where all railroad papers published in the English language should be filed, and all publications relating to railroad management or affairs collected. The members of the Association should aid in every way possible the creation of a

PROFESSIONAL LITERATURE

and the development of a taste for discussion among their employees. A perusal of the RAILROAD GAZETTE, the only paper that has yet appeared worthy of generous support, shows what little interest is taken in the details of their profession by the rising generation of railroad managers. The Association may do much to create an interest by affording a school for specialists to shine in by indorsing such efforts as are made by juniors. Members should be encouraged to read papers on subjects for discussion. Prizes might be offered for the best essay on given subjects, open to all. Whatever results may be attained in this line will be owing to the ambition of the rising generation, and to foster such ambition is one of the high duties of the Association.

STATISTICS

are the food on which the theorizer lives. Some of what are apparently absurd and useless columns of figures are indispensible aids to the attainment of very useful results. The most useful class of statistics is just that which cannot be gathered except by co-operation of many different, if not all railroads. Indeed, to facilitate the comparison and the working up of some of the statistics, it is desirable that

A UNIT OF EXPENDITURE

be established. For many obvious reasons we need not expect at an early date so great a stride as this; but the Association should accomplish as much as it can. One class of statistics it is of the highest importance to commence work at immediately.

TABLES OF ACCIDENTS.

Every accident of greater importance than the derailment of a yard engine should be recorded in the office of the Association minutely, and all its causes honestly traced. A list should be published, say every six months, giving also estimated, if not actual, loss by each accident. The mention of such a publication of course touches many on a sore spot; but there is no necessity for the publication of names of individuals or roads. Every communication on the subject could be held privileged, and the publication might be a privileged issue to members. What we want to know is the prevailing causes of accidents and the extent of loss; whether it is more economical to avoid the chance of loss by outlay of capital, or to run the chances. Personally, I believe there is a higher law which should guide the policy than that of dollars and cents, but some think otherwise. The New York *Evening Post* a short time back foreshadowed in a short pithy article what is in store for the officers of public corporations. "The country has as yet no properly educated conscience on this subject. When the public learn to regard negligence in these high trusts as a crime, not less reprehensible morally than the killing of a man in the heat of passion in a private broil, it will only have come up to the just standard of the law, and will only then be ready to enforce the law as it is. The public need an education on this subject, which they will rapidly get, if the principles we have indicated are kept in view by the independent press and constantly applied to all such cases as they occur."

Akin to the statistics of accidents is the

BLACK LIST.

The managers of railroads owe a moral duty to themselves, to their employees and to the public to exclude all bad characters and criminally incompetent men from railroad service. The most delicate sense of manliness or of justice finds nothing offensive in this; on the contrary, it urges the adoption of such a policy. The material welfare of proprietors of railroads and the interests of the traveling and commercial public alike call aloud for the reformation, while to the employees themselves—that is, to those who are worth keeping—the news of it would be glad tidings. The importance of the subject is so great, so self-demonstrative, that naught but bare mention of it is here necessary. Co-operation and moral courage are the prerequisites. The former may be difficult of attainment. Let us hope the latter is all there.

EXPERIMENTS.

A class of these come within the scope of the Association—such as are of general interest and require special skill. Desultory experiments here and there by individual roads are not calculated to produce any great result. Naturally, those who have gone to the expense of making the experiment are chary of communicating its results to those who stood by, but lent no helping hand. The economy of experiments is a matter that I trust has passed beyond the region of controversy. Yet how strange is it that some of the simplest facts have not yet been ascertained, or at least publicly declared, because no one has made the necessary experiments. Each one stands waiting for some one else to move. Afraid of all moving at once, no one stirs. An example occurs to me just now. I understand that with all the facilities we have in this country for testing the effects of cold on iron and steel, there is as yet no reliable record.

ABUSES.

Competition has been the cause of introducing into railroad management many abuses leading to useless expenditure. It must be an aim of this Association to expunge all such abuses, and to work unceasingly until that end is accomplished. Of the many abuses calling for reform, the "free-pass system" and the "payment of commissions on the sale of tickets" are two that make themselves directly felt, the burden of which is becoming more and more oppressive. Involving a large outlay, they bring absolutely no return, but are demoralizing in their tendency and create discontent often in the very spots where they are scattered to propitiate. No manager has a patent for the issue of passes. The power is possessed by all equally. If A gives passes to procure business, B can do the same. If B's road is a good one, offering special facilities for the ship-

per, A perhaps cannot procure business unless he offers some inducement. If he try to propitiate the shippers by a free issue of passes, B issues passes to the same people, and can afford to do so better than A can. So A is no better off than he was before, as regards advantages over B; but both of them have lost a certain sum from the passenger earnings of the road. How much better would it be if neither gave a pass, but made his rates openly, squarely and above-board. Nothing is gained in the long run by trickery and would-be sharpness-in-the-dark. Again, as to commissions, if A pays two dollars a ticket, B will pay not less—maybe more; so A has gained no advantage. If B pay two and a quarter, A must increase his payment, and if he wish to keep ahead must give two and a half. B then gives three, and so on, much to the satisfaction of the ticket agents, but much to the loss of everybody else. Such payments are money thrown away, without a particle of value in return. An enlightened, honest set of managers will surely not permit so great an evil to live much longer.

PERMANENT COMMITTEES

should be appointed on abuses and grievances. One for each great grievance, such as the "free-pass system," or "ticket-commissions." These committees should be of not less than ten members, resident in the different large railroad centres, and should be chosen for their influence, enthusiasm and keen appreciation of the evil they are called on to eradicate. Persistent action, appealing to the honorable instincts and intelligence of railroad managers, could not fail of success sooner or later. Petty jealousy is the demon that stands in our path, thwarting our efforts. Let us hope that those men who, here and there, trusting to their own cunning, prevent the adoption and carrying out of honorable agreements will, ere long, give way to nobler and wiser successors. The standing commitees on abuses should be very much larger than those on other subjects, so as to include all the influential men who are willing to identify themselves with the movement.

SPECIAL COMMITTEES.

A word as to these: They should be carefully drafted, so as to include members who have special knowledge of the subject to be reported on, *and who are willing to act.* The members of committees should remember that they are appointed, not to give individual opinions, but to act as brain-suckers by obtaining the opinions of a large number of persons whose positions and experience give their opinions peculiar value, and particularly to obtain the reasons for those opinions, and to collect statistics relating to the subject. After having collected all the available information, they should tabulate and arrange the statistics and discuss the whole subject. This involves considerable clerical labor, but for that purpose a Secretary has been appointed, who only requires guidance and instructions from the committee. There is only one method of going about the job expeditiously and thoroughly, and that is by issuing circulars containing questions carefully framed to elicit information in all the details of the subject. The answering of these questions should be a duty of love to every member, and not be looked upon as a bore.

ATTENDANCE.

Members should, at least until the Association is thoroughly organized, strain a point to be present at the meetings. With some, at times, attendance will be impracticable; they should aid by answering circulars promptly and good naturedly, communicating views on important subjects, suggesting by letter subjects for discussion, and in such manner testify their interest in the doings of the Association. The working members should be patted on the back now and then, and their exertions cordially appreciated.

HASTEN SLOWLY.

Our President, in his report for the past year, said: "This Association is essentially a deliberative body, and action should not be determined on until after thorough and exhaustive discussion." It will be well for us to remember these words. We must not demand immediate results. We must look rather to the obtaining of results through the creation of a healthy moral tone of fraternity and a stimulated intelligence. No false step should be taken that might lower the dignity or impair the usefulness of the Association. This matter should, I think, be carefully watched by the President, who, chosen on account of ripe professional experience and high intellectual attainments, should be the Moderator of the society and should raise his warning voice whenever he sees that an unwise step is about to be taken. It would, I think, be best to make a by-law that final action be not taken on the recommendation or report of any committee until the meeting next after the presentation of the report, and until after a copy has been placed in the hands of every member.

CONSTITUTION OF THE ASSOCIATION.

This is a subject requiring careful and early attention. I do not feel that I can here do full justice to the subject, and will therefore only say that a general assembly can never take the place of a local society. There are many matters of great local importance that cannot obtain a hearing or be properly handled in any association except a local one. It seems to me necessary to call into existence local associations in every section of country, all being tributary to the Railway Association of America. As the Railway Association of America is composed of the highest officers, viz., presidents, vice-presidents and general superintendents, I do not see why the associations of general freight agents, general ticket agents and master mechanics should not be recognized as sub-associations, and matters specially relating to their departments be relegated to them for discussion and report. All agreements should be reported on and laid before the Railway Association of America for confirmation. A recognition of their existence and value would stimulate those bodies to useful action. For instance, the subject of the "Relation of Railways to Express Freight Lines and their Management," and the "Desirability of Introducing the English Clearing-House System," might in the first place be handed over to the General Freight Agents' Association for report. A committee of that body could supply valuable figures and details, and from special acquaintance with freight management be able to produce a valuable report. This report could then be dissected and discussed by the Railway Association of America, and final action ordered. These are but hints thrown out. As I said before, the subject is a very important one and should receive early attention. A permanent committee should be appointed at the May meeting to attend to it. EXCELSIOR.

Are there not too Many Engineers?

TO THE EDITOR OF THE RAILROAD GAZETTE:

Are not too many of our young men preparing for the profession of civil engineering? Every State has its agricultural college, and almost every other college has its scientific department, and there are several independent scientific schools in the country. Each one of these institutions is graduating every year from one to a dozen young men as civil engineers, and beside all these there are the regular recruits from the offices. Are not half of these young men fitting themselves for work which they will abandon, after two or three years' trial, for occupations which offer greater rewards with more of the comforts and fewer of the hardships of life?

If the indications of supply and demand are to be trusted, it seems as if the answer must be affirmative. In the spring our great railroad corporations organize their engineer corps, work them hard during the summer, and when winter sets in discharge them. Thus for the wages of seven or eight months they get all the work done that the engineer can do in a year, and his enforced idleness for four or five months is of as little concern to them as if he were a day laborer. When spring comes round again there are plenty ready to fill his place, as a glance at your advertising columns will show.

A correspondent of *The Engineer* (London, December 27, 1872, page 431) shows that the case is similar in England. He finds that after ten years' work his income has averaged £38 per year, and he adds: "Out of twenty-five young fellows, pupils at or about the same time as myself, I only know of three who still remain in the profession. I believe that the bar, the medical profession, or the church (considered as a means of earning a livelihood) offer quite as good chances of success."

He is followed by a correspondent of *Engineering* (London, January 3, 1873, page 7), who indulges in a very doleful strain.

This, it seems to me, is a matter worthy of a passing notice at least. S. R.

March 2, 1873.

Check Chains.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Some weeks since I noticed in your excellent journal an able editorial on the efficacy of truck chains. The thought struck me, while reading it, that really truck chains, as they are generally made, are mere ornaments, and that in use they are of no practical account. I saw, or rather experienced, an accident the other day on the Toledo, Wabash & Western Railway, which exhibited how thoroughly inadequate the present chains are to accomplish the purpose for which they are intended. We were leaving a small station a short distance west of Fort Wayne, running about two miles per hour, when a rail turned over, the passenger car and sleeping car ran into the ditch, only about 18 inches in depth, and although the train was stopped in less than two car-lengths, the entire four trucks were slewed around square across one rail and the ditch. On examination I found that the staples holding the chains to the car bodies were mere screw-bolts screwed into auger holes in the floor beams. Of course the strain jerked them out immediately.

Another thought suggested by your article was this: Would it not be better for railroad men to endeavor to devise something to keep cars on the track rather than to spend time and money upon appliances which are only of utility when they are off the rails? They should strike at the root. Heavier rails, deeper flanges, thicker axles, etc., will tend to diminish the use of and necessity for truck chains. SAFETY.

PITTSBURGH, February 28, 1873.

Chords and Ordinates.

ALLEGHANY STATION, Va., February 27, 1873.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Having had some special practice with long and short chords and their ordinates, I sent you the following rule, which has escaped Henck and Trautwine:

The middle ordinate of any chord = $\frac{1}{4}c^2 \times$ tang. deflec. for 100 feet, 100 *feet being the unit of measure of the chord.*

Thus, chord = 400 feet, 1° curve; here $c = 4$. Then,

$$\text{middle ordinate} = \frac{16}{4} \times .875 = 3.5$$

And, chord = 18 feet, 5° curve; here $c = .18$.

$$\text{middle ordinate} = \frac{.0324}{4} \times 3.49 = .0283$$

The results are found in Henck, page 116, *et seg.*, for 18 and 20 feet rails, and in Trautwine, page 418, for all rails in common use. I only claim a new and simple rule. C. E. W.

Who Should be Made Train Dispatchers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Who are the most competent persons to handle trains by telegraph, or in another shape, who makes the *best* train dispatcher—an old and experienced conductor, engineer or yard-master who cannot telegraph himself—or an operator fitted for the business with a slight practical knowledge of railroading? This question I often hear debated, and in my opinion it is a one-sided question; but others may not think as I do. As I know a great many do not, I would like to hear the opinion of some of our superintendents on this subject; also the train dispatchers.

This is a question I think all railroad officers are interested in. It has its warm friends on both sides.

THE SCRAP HEAP.

Prices of Rails in February.

Bigelow & Johnston, of No. 48 Pine street, New York, report as follows:

New foreign iron rails, $71 to $73, gold; new American iron rails, $80 to $85, currency (the prices representing the range as nearly as possible according to location of mill).

New foreign steel rails, $109 to $112, gold; new American steel rails, $122 to $125 currency. Old double-head rails, $52, gold, and $57 to $60, currency; old T or flange rails, $56 to $57, currency. The imports of new iron rails at New York were 2,666 tons in February, and 5,276 tons for January and February; of new steel rails, 4,995 tons in February, and 8,771 tons in the two months. The total new rail imports were 14,047 tons in 1872, 9,757 tons in 1872, and 14,640 tons in 1871. The imports of old rails at New York were 940 tons in February, 1873, 2,729 tons for January and February of 1873, 6,708 tons for the same two months in 1872, and 6,512 tons for the same time in 1871.

In their circular, Messrs. Bigelow & Johnston say:

"*New Rails.*—Unmitigated dullness, amounting almost to stagnation, has been the prevailing feature of the past month. Buyers hold off notwithstanding that the current prices are well known to be far below cost of importation. Holders, believing that before long they must be masters of the situation, are content to wait, and do not press sales. The strike in South Wales continues, and as at last advices there were but two vessels loading for New York, at Newport and Cardiff, there must ensue a considerable period during which our receipts from that important quarter will be reduced to a minimum.

"In *American* rails nothing of importance has transpired. For *steel* the demand has been fair, but largely for 1874 delivery, on a basis of about 112½ gold.

"*Old Rails.*—As the season advances holders increase in firmness, fortified as they appear to be by light arrivals and advancing prices abroad. The demand, however, is very small, and we make but little impression on our stock. The rolling mills complain that the price of new rails admits of no margin for the purchase of old material at the current rates. Our quotations represent the range, some straggling sales taking place at the minimum, but most of the stock held at the higher figure."

Power-Brake Patents.

The following is a list of the American patents on power brakes:

George E. Sellers, November 13, 1847.
Thomas Walker, March 16, 1852.
Henry Miller, January 2, 1855.
Wendell Wright, January 16, 1855.
T. E. Sickles, March 24, 1857.
J. L. I. and D. W. Branch, January 5, 1858.
Lewis Kirk, May 10, 1859.
William W. Virdin, July 5, 1859.
C. R. Davidson, February 7, 1860.
Nehemiah Hodge, June 12, 1860.
A. I. Ambler, June 17, 1862.
William Loughridge, April 19, 1864.
Sylvester Marsh, November 8, 1864.
Samuel N. Goodale, May 30, 1865.
L. H. Dwelley, November 28, 1865.
X. X. Buckner, January 2, 1866.
John Davis, May 29, 1866.
C. R. Peddle, February 5, 1867.
E. Bourson, November 19, 1867.
A. DeBergue, March 24, 1868.
S. M. Lee, July 28, 1868.
George Westinghouse, April 13, 1869.
William L. Chambers, July 6, 1869.
J. M. Crosby and William Ballard, February 8, 1870.
S. Marsh, April 12, 1870.
T. and H. Hopper, and C. C. Coats, June 7, 1870.
T. E. Sickles, July 12, 1870.
L. Hill and S. D. Trip, March 7, 1871.
George Westinghouse, June 6, 1871.
George Westinghouse, August 8, 1871.
John T. Bassett, October 17, 1871.
S. N. Goodale, October 31, 1871.
Robert J. Wilson, November 14, 1871.
Richard S. Gillespie, November 28, 1871.
George Westinghouse, January 9, 1872.
John W. Gardner, January 23, 1872.
George Westinghouse, January 23, 1872.
T. O. Ward, January 30, 1872.
S. N. Goodale, January 30, 1872.
George Westinghouse, March 5, 1872.
George Westinghouse, March 5, 1872.
George Westinghouse, March 5, 1872.
S. N. Goodale, March 5, 1872.
T. W. Welsh, April 9, 1782.
John W. Gardner, April 23, 1872.
Charles A. Haskin, May 28, 1872.
J. W. Gardner and Thomas W. Ranson, June 25, 1872.
John Y. Smith, July 23, 1872.
J. C. Wightman, July 30, 1872.
William Naylor, July 30, 1872.
S. N. Goodale, August 6, 1872.
S. N. Goodale, August 6, 1872.
John Y. Smith, August 6, 1872.
Theodore Luce, September 10, 1872.
J. W. Gardner, T. W. Ranson and Edwin Martin, December 10, 1872.
George Westinghouse, December 24, 1872.
George Westinghouse, December 24, 1872.
George Westinghouse, December 22, 1872.

More power-brake patents were granted in 1872 than from organization of Patent Office down to close of year 1871, which indicates, doubtless, that Mr. Westinghouse's great success has awakened interest in the matter—and perhaps a desire to share in the profits of "a good thing."

Besides the American patents, in England patents have been granted for 21 electro-magnetic brakes, 20 hydrostatic, 30 pneumatic and 54 steam brakes.

Protection to Employees.

A bill has been introduced in the New York Legislature for the protection of railroad employees, the first section of which provides that any railway company in the State shall be liable for injury or loss of life happening to any of its employees, except where the injury or loss of life is the fault of such employees, and that compensation or damages may be recovered in an action in any court of competent jurisdiction. The second and third sections provide that in case of accident to any employee without his fault, resulting in the loss of an arm or leg, or permanent disability, the person so disabled shall be entitled to recover compensation or damage in an action at law, to an amount not exceeding $5,000 nor less than $1,500; and in case of death resulting from such accident, the legal representatives of the employee may recover a sum not exceeding $7,000 nor less than $2,000, as the court may determine.

Tabulated Comparative Results, Compiled from the Returns of the several Railroad Corporations in Massachusetts, for the year ending September 30, 1872, from the Commissioners' Report.

Number	Names of Corporations.	Stock, Debt and Cost per mile of road owned.							Income and Expense per mile of road operated.							Number
		Stock.		96.—Debt.	97.—Stock and Debt.	Cost.			101.—Gross Income.	Expense.					106.—Net Income.	
		94.—Authorized by Charter.	95.—Paid in.			98.—Road.	99.—Equipment.	100.—Total Investment.		102.—Maintenance of way.	103.—Traffic Expense.	104.—Telegraph.	105.—Total.			
5	Boston & Albany	$109,462 00	$78,772 98	$14,291 15	$93,064 13	$79,679 58	$17,671 55	$101,169 70	$34,514 68	$6,152 71	$17,527 46	$38 89	$25,708 15		$8,806 52	5
6	Boston, Barre & Gardner	46,153 84	28,316 92	5,270 00	33,573 92	29,350 54	4,029 74	33,373 67	2,667 51	699 74	1,305 83	..	2,377 11		290 30	6
7	Boston, Clinton & Fitchburg	35,194 77	20,354 56	29,157 92	49,512 48	30,060 42	15,070 03	50,417 08	5,808 27	840 12	2,763 23	19 22	4,462 77		1,345 50	7
8	Boston, Hartford & Erie	..	..	161,870 50	161,870 50	..	..	194,870 50	4,096 25	842 42	2,003 46	..	3,103 40		992 85	8
9	Boston & Lowell	79,064 32	52,259 88	55,876 67	108,136 55	75,572 46	5,902 81	106,784 19	14,621 12	3,205 01	6,809 86	8 82	11,897 78		2,723 34	9
10	Boston & Maine	84,592 14	82,378 54	9,516 72	91,895 27	81,321 13	13,891 86	103,899 02	14,209 32	3,373 60	6,277 46	33 24	10,708 51		3,500 81	10
11	Boston & Providence	68,876 06	67,521 36	..	67,521 36	63,233 13	2,545 12	71,027 01	25,810 52	5,919 73	11,316 50	14 66	18,812 81		6,997 69	11
13	Cape Cod	13,289 17	10,847 65	4,912 04	15,759 04	17,733 33	2,523 85	20,629 68	3,421 20	797 00	1,675 37	..	2,499 05		922 15	13
13	Cheshire	55,949 27	40,158 53	15,091 38	53,993 37	43,597 67	6,557 25	52,138 88	9,359 54	1,793 81	4,431 31	25 66	7,273 17		2,086 37	13
14	Connecticut River	42,435 09	33,124 48	8,371 53	41,495 17	34,673 50	4,043 22	40,847 65	13,131 03	3,165 64	4,943 64	..	9,272 81		3,858 21	14
16	Duxbury & Cohasset	25,774 28	20,000 00	2,285 71	22,285 71	21,972 51	..	21,972 51	2,058 94	498 11	1,449 89	..	1,977 00		81 94	16
17	Eastern	54,465 07	37,688 77	65,852 71	103,541 48	58,794 83	18,423 98	85,025 42	7,457 48	1,560 61	3,129 89	10 95	5,287 82		2,169 66	17
19	Fitchburg	42,863 26	42,863 26	..	42,863 26	37,541 49	6,000 85	45,9 0 22	14,469 44	3,530 08	6,002 64	7 07	10,998 22		3,471 22	19
21	Hanover Branch	20,304 56	15,647 20	5 056 14	20,723 36	22 94 06	4,701 80	26,795 87	26,836 61	4,952 13	10,264 61	10 70	17 248 05		9 588 56	21
22	Hartford & New Haven	82,802 54	82,802 54	7,388 53	90,191 08	60,246 89	11,110 78	71,357 68	26,836 61	4,952 13	10,264 61	10 70	17 248 05		9 588 56	22
31	Middleborough & Taunton	17,584 99	17,371 04	587 08	17,958 12	15 828 94	4,699 14	20,689 11	4,265 70	1,013 71	1,941 93	..	3 441 10		824 51	31
35	Nashua & Lowell	55,172 41	55,172 41	3,367 24	58,539 65	51,838 43	9,559 04	67,006 28	13,621 38	3,280 64	6,173 44	5 39	11 6 7 62		2,013 75	35
36	New Bedford & Taunton	22,105 58	18,815 97	4,738 87	18 554 84	18,719 34	2,063 60	22,040 58	7,777 05	1,446 57	4 040 11	26 45	6,040 05		1,737 00	36
39	New Haven & Northampton	27,439 86	19,207 90	12,029 04	37,236 51	23,345 51	8,000 45	38,028 40	6,011 50	1,030 83	2,569 09	..	3 996 70		2,0 4 79	39
40	New London Northern	20 0: 0 00	14,188 00	4 215 00	18,403 00	....	....	15 303 30	5 542 70	1 359 05	2,374 35	..	4.046 91		1,495 79	40
41	Norwich & Worcester	42,545 18	42,541 08	11,965 76	54,4 6 84	37,108 17	2,254 69	51, 37 51	12,458 87	1,314 39	4,572 99	..	7 272 92		5,255 95	41
42	Old Colony & Newport	45,761 90	34,531 82	23,271 06	58,105 70	48,034 21	6,090 09	58,310 27	12,959 75	2,466 32	5,358 53	39 41	8 655 07		4,304 68	42
44	Providence & Worcester	67,552 35	45 034 90	15,424 45	60,459 35	42,6 5 23	15 381 80	57 987 04	18,948 75	3,709 33	8,457 76	22 78	13,874 17		5 074 58	44
45	Salem & Lowell	23,104 26	14,419 80	13,411 94	27,855 74	22,892 50	4,89 01	27,782 51	....	....	....	..	....		....	45
46	South Shore	51,948 05	22,483 54	23 809 53	46,293 94	49,014 43	3,413 53	54,250 47	7 881 81	2,229 48	3,595 95	..	6,0 9 76		1,852 05	46
50	Taunton Branch	27,093 59	24,630 54	4,732 80	29,363 34	22,465 52	3,554 76	28,151 59	8,477 99	940 38	4 186 56	22 16	6,092 68		2 385 31	50
51	Vermont & Massachusetts	58,669 32	35,760 91	12,094 60	47,795 51	40,612 78	3 260 93	46 724 94	6,274 73	1,436 79	2 156 80	7 20	4,365 69		1,909 03	51
55	Worcester & Nashua	45,961 91	31,197 19	7,512 05	38,709 25	41,516 99	6 899 37	48,416 37	12,855 30	1,975 94	6,051 90	..	8,577 50		4,277 80	55
	Average	$51,381 57	$37,159 64	$24,628 11	$61,778 75	$51,147 27	$6,873 95	$61,921 66	$12 768 37	$2,478 49	$5,724 92	$14 29	$9 222 31		$3,546 06	

Number	Names of Corporations.	Earnings per Train Mile.				Expenses per Train Mile.													Number
						Maintenance of Way.				Traffic Expenses.						Miscellaneous.			
						Repairs.				Repairs, including new.		Salaries, Wages, etc.							
		107.—Passenger*.	108.—Freight†.	109.—Gross Income.	110.—Net Income.	111.—Road.	112.—Bridges.	113.—Buildings, etc.	114.—New Rails.	115.—Total.	116.—Locomotives.	117.—Passenger and Baggage Cars*.	118.—Freight Cars†.	119.—Passenger Department*.	120.—Freight Department.	121.—Fuel.	122.—Oil and Waste	123.—Total.	124.—Taxes.	125.—Sundries.	126.—Total Expenses.	
5	Boston & Albany	$2 37	$1 63	$1 89	$0 48	$0.187	$0.013	$0.026	$0.111	$0 338	$0.123	$0.329	$0.166	$0.516	$0.351	$0.208	$0.021	$0 163	$0 084	$0.025	$1.41	5
6	Boston, Barre & Gardner	69	1 12	84	09	.218	.007	.022	....	.221	.021	.019	.056	.163	.378	.127	.014	.413	.015	.102	.75	6
7	Boston, Clinton & Fitchb'g	99	1 98	1 30	30	.112	.009	.031	.037	.188	.070	.015	.124	.171	.380	.167	.021	.625	.018	.031	.66	7
8	Boston, Hartford & Erie	98	2 43	1 54	37	.128	.04	.014	.013	.318	.059	.088	.019	.023	.051	.174	.012	.757	.013	.084	1.17	8
9	Boston & Lowell	1 42	2 01	1 74	32	.196	.051	.072	.062	.382	.072	.099	.136	.205	.504	.161	.028	.812	.066	.157	1.43	9
10	Boston & Maine	1 48	1 92	1 68	42	.164	.038	.084	.113	.399	.065	.089	.167	.263	.393	.170	.017	.743	.07	.048	1.26	10
11	Boston & Providence	1 91	3 23	2 44	66	.169	.045	.220	.126	.560	.126	.200	.329	.353	.719	.163	.018	1.07	.103	.047	1.78	11
12	Cape Cod	1 69	1 34	1 52	41	.281	.000204	.012	.059	.355	.121	.085	.333	.199	.221	.115	.013	.614	.068	.077	1.11	13
13	Cheshire	1 76	1 19	1 32	29	.109	.004	.059	.084	.254	.104	.171	.076	.178	.197	.203	.016	.626	.038	.114	1.03	13
14	Connecticut River	1 91	2 64	2 26	66	.237	.012	.127	.158	.535	.082	.156	.148	.310	.540	.198	.016	.852	.114	.096	1.60	14
16	Duxbury & Cohasset	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	16
17	Eastern	1 71	2 08	1 40	41	.118	.023	.094	.058	.294	.065	.118	.123	.261	.451	.137	.018	.590	.054	.056	.99	17
19	Fitchburg	1 39	2 29	1 88	45	.197	.031	.108	.123	.459	.124	.089	.086	.229	.432	.166	.014	.782	.105	.085	1.43	19
21	Hanover Branch	2 01	....	3 38	96	.132	....	.024	....	.156	.023	.047	....	.123	....	.099	.012	.692	.028	.153	2.42	21
22	Hartford & New Haven	2 78	3 38	2 69	96	.284	.005	.110	.096	.497	.169	.123	.299	.322	.916	.163	.020	1.03	.134	.061	1.73	22
31	Middleborough & Taunton	99	2 84	1 69	32	.2-7	....	.037	.077	.402	.089	.013	.105	.279	.784	.145	.021	.771	.057	.135	1.37	31
35	Nashua & Lowell	1 42	2 01	1 76	26	.195	.049	.117	.062	.424	.072	.099	.136	.256	.420	.168	.018	.799	.066	.212	1.50	35
36	New Bedford & Taunton	1 77	4 09	2 30	51	.199	.0102	.121	.098	.429	.162	.304	.041	.369	.211	.163	.032	1 20	.068	.096	1.79	36
39	New Haven & Northampton	96	1 85	1 53	52	.135	.0075	.014	.10	.256	.026	.027	.041	.244	.364	.131	.022	.654	.047	.036	1.01	39
40	New London Northern	1 05	1 59	1 60	43	.336	.025	.031	....	.392	.096	.052	.211	.154	.298	.182	.013	.685	.043	.047	1.17	40
41	Norwich & Worcester	1 43	2 08	2 02	85	.145	.025	.023	.019	.212	.080	.085	.145	.231	.397	.161	.013	.740	.068	.124	1.17	41
42	Old Colony & Newport	1 54	1 97	1 71	56	.172	.015	.066	.071	.325	.059	.109	.214	.219	.468	.130	.013	.706	.058	.05	1.14	42
44	Providence and Worcester	1 69	1 89	1 76	47	.195	.043	.042	.063	.345	.098	.038	.124	.331	.561	.153	.019	.787	.076	.072	1.29	44
45	Salem & Lowell	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	45
46	South Shore	1 32	2 23	1 51	36	.244	.024	.064	.094	.428	.117	.050	.123	.237	.612	.173	.029	.690	.026	.019	1.15	46
50	Taunton Branch	1 27	2 77	1 82	51	.139	....	.050	.012	.202	.072	.066	.125	.469	.658	.186	.028	.90	.063	.144	1.31	50
51	Vermont & Massachusetts	1 32	2 83	2 03	68	.322	.034	.056	.097	.511	.068	.107	.163	.225	.466	.179	.016	.768	.082	.192	1.55	51
55	Worcester & Nashua	1 78	1 50	1 62	54	.0552	.0057	.051	.049	.162	.107	.146	.118	.313	.311	.202	.012	.769	.098	.059	1.08	55
	Average	$1 67	$1 88	$1 81	$0 50	.174	.022	.063	.092	.352	.096	.149	.156	.292	.419	.173	.019	.814	.074	.07	1.31	

Number	Names of Corporations.	Average Rates of Fare and Freights per Mile.							Dead Weight Hauled One Mile.		Average Miles Run.			Average per Train Mile.		Carried One Mile per Car Owned by Company.		Per Cent. of—			Number
		Passengers.				Freight, Tons.			Tons to Each.												
		127. Season Ticket.	128. Trip & Passage ticket.	129. To and from other roads.	130. Aver'ge dist'nce traveled.	131. Local.	132. To and from other roads.	133. Aver'ge dist'nce carried.	134. Passenger.	135. Freight, ton.	136. Locomotives.	137. Passeng'r cars.	138. Freight cars.	139. Passengers carried.	140. Freigh't, tons carri d.	141. Passengers.	142. Freight tons.	143. Income to stock and debt.	144. Expense to income.	145. Net income to stock & debt.	
5	Boston & Albany	$0.0105	$0.0269	$0.0256	21.54	$0.0287	$0.0154	106.11	1.674	5.22	23 704	33,519	14.729	93.	81.	624,571	70,724	.40	.75	.102	5
6	Boston, Barre & Gardner	.0123	.0376	.0356	13.8	.0925	.0529	22.17	4.05	6.11	20.516	14,881	3,084	19.	17.	293,872	7,760	.079	.89	.0086	6
7	Boston, Clinton & Fitchburg	.0055	.0325	.0225	20.62	.02	.02	48.05	1.69	3.33	21.035	22,940	6,740	40.	84.	459,548	31,447	.266	.6-5	.063	7
8	Boston, Hartford & Erie	.0103	.0258	.0272	9.5	.057	.03	27.35	2.95	3.07	19,414	38,873	7,804	46.	57.	444,529	27 848	.037	.557	.00906	8
9	Boston & Lowell	.0099	.0274	.0197	13.11	.039	.0276	28.47	2.102	5.048	20,054	42,135	11,307	68.	49.	555,808	18,780	.28	.77	.032	9
10	Boston & Maine	.00735	.0259	.0221	13.84	.0285	.0204	39.93	1.73	4.081	19,934	36,432	10,813	78.	49.	561,249	21,841	.358	.769	.088	10
11	Boston & Providence	.0116	.0293	.0269	11.43	.048	.0306	26.65	1.9	2.57	18.480	34.400	13 891	78.	85.	543,330	42.333	.434	.728	.117	11
12	Cape Cod	.0047	.0358	.0296	25.29	.0419	.0425	24.76	2.527	4.193	21.068	28,484	4,439	55.	31.	299.585	56,017	.285	.777	.063	12
13	Cheshire	.0024	.0334	.0303	34.28	.0271	.021	55.52	1.99	3.	22,223	19,719	11,705	52.	47.	299,585	56,017	.285	.777	.063	13
14	Connecticut River	.00825	.032	.0333	11.14	.073	.032	25.35	1.846	3.515	18 003	28,199	11,800	65.	68.	457,752	32,324	.31	.71	.093	14
16	Duxbury & Cohasset	.012	.034	.0 5	7.82	.073	.058	10.64	....	....	....	....	....	....	....	....	....	.052	.96	.0036	16
17	Eastern	.0088	.0247	.0 7	13.29	.042	.017	30.24	2.035	4.9	19,222	40,886	7,599	86.	49.	499,973	15,026	.168	.709	.049	17
19	Fitchburg	.0102	.024	.0221	13.02	.068	.025	26.5	1.859	2.966	18,848	32 584	7,755	64.	59.	529.155	27 946	.337	.76	.081	19
21	Hanover Branch	.0112	.035	.0325	4.29	.08	.06	4.06	.412	....	10.500	10 500	....	16.	....	114.499	4 506	.435	.60	.12	21
22	Hartford & New Haven	.007	.0292	.0283	27.51	.032	....	41.88	1.484	2.198	21.139	61,124	9,64	97.	106.	1.086.681	42.981	.29	.64	.106	22
31	Middleborough & Taunton	.0084	.0437	.0511	6.96	.10	.127	4.7	2.93	7.111	21.472	7,105	4,259	21.	21.	143,4 0	4.402	.237	.806	.045	31
35	Nashua & Lowell	.0099	.0274	.0197	13.11	.039	.276	27.55	2.2	5.048	19.609	41,466	9,430	65.	49.	546,985	18,794	.692	.85	.097	35
36	New Bedford & Taunton	.0077	.027	.0434	14.14	.06	.0681	9.54	2.25	3.18	18,537	17,311	3,103	52.	61.	250 579	10 484	.42	.77	.091	36
39	New Haven & Northampton	....	....	....	18.36	....	.03-5	41.53	....	....	21,450	38,443	....	29.	39.	373,315	25,377	.16	.66	.055	39
40	New London Northern	....	....	....	14.93	.058	.025	46.88	2.88	6.7	19,999	27,217	11,295	25.	50.	340,893	28,459	.347	.73	.0939	40
41	Norwich & Worcester	.079	.034	.0333	16.73	.038	.043	28.31	2 55	4.4	20,504	22 253	10.050	42.	55.	455,767	25,373	.228	.578	.093	41
42	Old Colony & Newport	.01	.026	.017	13.07	.0549	.0333	27.29	1.852	4.803	24,681	30,016	12,938	68.	42.	425,929	22,936	.223	.667	.0741	42
44	Providence & Worcester	.0078	.0276	.0276	9.01	.0349	.0276	30.4	1.87	4.65	18,792	22,397	9,108	66.	59.	499,024	23,485	.333	.732	.089	44
45	Salem & Lowell	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	45
46	South Shore	.0145	.0474	.022	5.91	.085	.081	5.77	1.813	3.406	20,054	....	3,604	55.	23.	241 841	1.714	.16	.765	.040	46
50	Taunton Branch	.0081	.0393	.032	10.20	.06	.0402	10.99	2.81	3 12	13,484	18,504	5,133	37.	64.	229 513	19,341	.288	.718	.081	50
51	Vermont & Massachusetts	.0094	.033	.037	21.9	.085	.08	22.4	2 39	4.54	19,176	15,516	4.545	41.	33.	318,139	10.773	.145	.695	.044	51
55	Worcester & Nashua	.00896	.0294	.0292	16.8	.0302	.025	32.01	2.278	4.5	21,153	44,162	14.609	61.	48.	534,735	33 052	.33	.667	.116	55
	Average	....	....	....	14.78	..	....	49.15	1.688	3.100	21,043	25,961	10,559	68.	67.	525,173	28,679	.228	.722	.063	

NOTE.—The roads omitted in the Comparative Tables are included in the returns of other roads or are unfinished. The *average* results of the Comparative Tables are the average for all the roads in the Commonwealth. The numbers of roads are those of previous tables, including roads not worked,

* Passenger Train Mile,

† Freight Train Mile.

RAILROAD GAZETTE

Published Every Saturday.
A. N. KELLOGG & CO., *Proprietors.*
S. WRIGHT DUNNING AND M. N. FORNEY, *Editors.*

CONTENTS.

	Page
ILLUSTRATIONS:	
Three-Spindle Belt-Cutting Machine	105
Six-Spindle Nut-Tapping Machine	105
Car Journal Bearing and Key	106
CONTRIBUTIONS:	
Longitudinal Rail Support.	106
Flat Wheels and their Effect on Track	106
The Railway Association of America	107
Are there not too many Engineers?	108
Check Chairs	108
Chords and Ordinates	108
Who should be Made Train Dispatchers	108
EDITORIALS:	
The Supply of Engineers	110
EDITORIALS.	Page
The Patent Duplex Ticket	111
Around the World	111
Record of New Railroad Construction	112
Editorial Paragraphs	112
GENERAL RAILROAD NEWS:	
Elections and Appointments	112
Traffic and Earnings	113
Personal	113
Old and New Roads	113
The Scrap Heap	108
MISCELLANEOUS:	
Bolt-Cutting and Nut-Tapping Machines	105
Standard Car-Journal and Key	106
Tabulated Comparative Railroad Results	109
Locomotive Returns—October	114

Editorial Announcements.

Correspondence.—*We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.*

Articles.—*We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.*

Inventions.—*No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

THE SUPPLY OF ENGINEERS.

On another page we publish a letter from a correspondent who seems to be apprehensive that the supply of engineers is becoming greater than the demand, and he quotes from some letters published in *The Engineer* and *Engineering*, which certainly gave a very gloomy view of the prospects for members of the profession in Europe. We receive letters of a similar character, from time to time, from those who have been unsuccessful in this country, so that we are naturally led to the inquiry whether engineering, using the term in a broad sense, is unprofitable, or success more than ordinarily difficult, and also what the conditions are which enable a person to succeed.

In speaking of engineers, it is difficult to fix any definite meaning to the term. All men who "run" steam engines of any kind are in this country called engineers; the chief of a fire company has the same title; there are civil engineers, who locate and build railroads, bridges and other permanent works; hydraulic engineers, who construct works for water supply; mining engineers and mechanical engineers, and a great body of men who do not seem to have any very definite occupation, but who find the title very ornamental and convenient to ballast any new project which they wish to "introduce." Mechanical, or, as they have been more recently called, dynamical engineers, are subdivided into almost innumerable classes, engaged in designing and constructing all kinds of machinery. The different branches of manufactures are each year becoming more and more distinct from each other. Besides those who are actively engaged in business, there are, as our correspondent has pointed out, many young men who graduate each year from our technical schools, and who, we fear, *think* they are engineers.

It will be well before giving any further consideration to this subject, and we might add before young engineers make any very loud complaints, to remember the good old maxim that "no one but the wearer knows where the shoe pinches." So only persons who are engaged in any business know the difficulties to be overcome; and it is a characteristic of human nature to magnify the evils which we encounter, and to regard with great complacency the burdens which others bear. Now if we turn to other professions we find a similar state of affairs: lawyers, doctors, clergymen, teachers, government officials in the civil service, and in the army and navy, all complain of underpay and small chance of promotion. The fact is, however, the road to advancement in any occupation is not to most of us a flowery path; on the contrary, it is very steep and rugged, and difficult, and none ever get up by waiting below, and wishing they were a long way up, or complaining of the difficulties in the way. The journey requires courage, persistency which never flags, a clear head and steady eye, and a certain definiteness of purpose which aims at real and not imaginary ends.

It should also be remembered by engineers, as well as others, that success in business of any kind depends upon their ability to produce *what the world wants.* Failure is, we believe, attributable as often to inability to know what is wanted as to incapacity to supply it. Either qualification alone is insufficient to command success. The truth is that large numbers of engineers are unable to produce what is demanded. We have applications every week almost from men who want positions who, when questioned, know almost nothing which can be turned to practical account, excepting in a secondary and entirely subordinate way. Civil engineers who know but little about locating a road, and nothing of the construction of bridges, and who never had the care of a mile of track in their lives, or, if they did, perhaps never handled a level or transit; draftsmen who have no ability to design machinery, and mechanics who never learned a trade. The questions which are asked when responsible positions are given, are not whether the applicant knows something about the duties he is to assume, or whether he has a smattering of the subject and a number of others besides; but the inquiries are whether he knows *all* that can be known about it, whether he is thoroughly informed about the latest improvements and practices, and whether his knowledge and judgment are so clear as to be entirely reliable. It is quite unimportant to a builder of locomotives whether the person employed knows anything about marine engines or not, but it is very requisite that he should know the proportion which ought to exist between the boiler capacity of the former class of engines and the dimensions of the cylinders and wheels and the adhesive weight on the latter. Mediocrity never commands a high price in the market, and pecuniary compensation bears a relation to a person's qualifications analagous to that which the pressure bears to the temperature of steam; that is, the *rate* of expansion increases as the temperature becomes higher. Water must be heated up to 212 degrees before it boils, or any pressure is produced. An increase of 76 degrees in the temperature produces a pressure of 50 pounds per square inch; but only 40 degrees more are required to raise the pressure the next 50 pounds, 29 degrees for the next, and only 21 more to run it to 200 pounds pressure. So most of us are obliged to spend the first twenty years of our lives before we earn enough to pay our expenses; or, in homely phrase, before we can "keep the pot boiling." After that, an increase of knowledge and experience raises the *rate* of our compensation in a much greater proportion than that which the information we acquire after bears to what we knew before we were twenty years old. The same law holds good of all subsequent acquisition. It is perhaps true that the law of success which we have described has a greater influence in the profession of engineering than in some others, or, at least, more than in ordinary business. The reason of this we believe to be that an engineer directs and devises the ways in which large amounts of money are to be expended; therefore it is economy to employ the very best talent to superintend such work, and usually very expensive and wasteful to employ any excepting the very best. To illustrate clearly what we mean, we will state a case that recently came under our own immediate experience: A manufacturing firm wanted the services of a draftsman, competent to design the class of machinery they were building. They wanted a person who was thoroughly acquainted with all the most improved methods of making such machinery, and with the latest practice of mechanical engineers in that line. As the person would necessarily be obliged to fill a very responsible position, experience and accurate knowledge and that other more rare qualification, great fertility of resources in devising, united with sound judgment in adopting mechanical devices for accomplishing purposes aimed at, were needed. The firm advertised for such a person, and although the pay would have been liberal, they were unable to find any one with the qualifications required. The latter were, of course, of a high order, but the fact that no one who possessed them was procurable is evidence that such persons can nearly always find lucrative employment. From all directions we hear of the difficulty of getting good draftsmen, and yet we could procure a regiment of poor ones at ten days' notice.

It is quite true that one reason why so few good draftsmen are to be found is because as a class they are paid so little, and another is because the occupation is somewhat unhealthful. But that good draftsmen can not be employed at low wages and poor ones can, shows that the former can command better pay elsewhere while the latter cannot.

It is of course not true that all engineers who are unsuccessful are so for the reason we have pointed out alone. The reason why many of them cannot find employment and liberal pay is because they do not know how to do what needs to be done. Many have neglected their opportunities for learning, and among those who have had their way to make in life, some have shown a greater liking for beer than for knowledge, and the atmosphere and society of a bar-room were more congenial than that of a library and books. There are of course many who apparently start in life behind others, their early education neglected, and with inferior capacities. There are some who apparently have always "carried weight in life," and in the race have been at a disadvantage. This is one of the inscrutable conditions of things which we must all accept and make the best of as we find it, but it is one to which few of us can with justice attribute our own want of success, or excuse our shortcomings.

The truth which all young engineers should lay to heart, and should keep before themselves constantly, is that their first duty is *to know their business.* The knowledge which will be valuable is not alone that which only ordinary experience and observation and study will acquire, but that which requires exhaustive, unwearying alertness—that sort of mental affinity for knowledge analagous to the chemical attraction by which some elements unite with and absorb each other. Without this constant habit and exercise of mental avidity for information, which searches everywhere and uses all available means of knowing, none can acquire that kind of ability which commands a high price in the open market.

To achieve success, an engineer or any other business man must have, besides a thorough knowledge of his own profession, capacity for knowing what is in demand and what is not; in other words, he must exercise just the same sort of capacity which a merchant does when he lays in a stock of goods; he must know what people want to buy. It must be remembered that the world is willing to pay only for those things which it wants, or can be made to want, to buy, and that the capacity of knowing what is wanted is very rare, and requires an exercise often of a very high order of intelligence. Without this kind of knowledge, success is extremely difficult to achieve. The experience of a gentleman in New York who has spent considerable time and money in the construction of traction engines for common roads will serve as an illustration of what we mean. His success in selling them has been very limited, the fact being that very few people *want* road locomotives, whereas a great many want engines for railroads, and nearly every shop in the country is now crowded with orders for the latter. We will not now discuss the question whether people *ought* to want road locomotives, the fact being that they do not; and those who were clear-sighted enough to see that railroad companies would want steam power, whereas farmers and others would not, reap the reward. Now this condition of things is universal. The far-sighted and clear-headed will always have an advantage over those who have not. Engineers must do exactly as all business men are obliged to—that is, learn what is wanted and then supply the want. If they undertake to produce what no one wants, or are unable to supply what is wanted, they have obviously no more right to find fault than any other class of business men.

While it may be conceded that this is true of manufacturing engineers, there are others who will say that it is not applicable to civil engineers, whose business is the construction of permanent works, or to officers in the engineering and mechanical departments of railroad and other corporations. That railroad companies and other corporations do not discriminate enough between the services of competent and incompetent engineers, we have frequently taken occasion to point out; and that their blindness is rapidly driving out of their employ many of the ablest men is also true; but the reason of this is that in the majority of cases railroad owners and managers are not engineers. Capital exercises a power here as elsewhere, and one reason why engineers have so little influence with capitalists is because the former often know so little about financial matters. If they studied such questions and were more competent to conduct the investment of money and better able to do it profitably, and to know what projects would and what would not pay, there would be fewer difficulties in the way of their having the control and management of such works, instead of being merely paid employees. Men with money to invest are naturally conservative and cautious, and try to be prudent, and sometimes learn to their sorrow that those they employ show more desire to exhibit their engineering skill than to earn dividends for stockholders. For this reason, timid capital-

ists place more confidence in the opinions and advice of bankers than in those of engineers. That this confidence is often misplaced, and that engineers would often be much safer advisers, could easily be shown; and that they might always be so, if they studied the financial side of the question or understood economical laws better, is quite certain. If they were, capitalists would come to them to advise about the investment of money, and thus they might have at least a certain amount of control over the works which they constructed.

The idea that engineers educated in technical schools, and without other experience, are competent to direct the construction of either permanent works or machinery is simply absurd, and every practical man knows it. "All sound science is based upon observation and experiment." While the advantages of education, as regards breadth of knowledge and systematic training, may be entirely with the graduate from the schools, yet they are likely to be fully compensated for in special cases by the enormously greater number of observations and experiments which a practical man has had the opportunity to make. When once the knowledge which the study of books and the instruction of teachers give is more thoroughly combined with the experience which is acquired by doing things, we will have fewer incompetent or unemployed engineers

What we have said is not at all intended to be comprehensive of all the difficulties which engineers encounter, but only some of the reasons why many are not more successful. We may return to this subject again.

The Patent Duplex Ticket.

A few months ago the newspapers had something to say of some trouble between the New York & Harlem Railroad Company, consequent on the introduction of a new ticket, intended, among other things, to serve as a check on embezzlements of money paid on trains for passage. The conductors, it was said, considered this ticket as a reflection on their honor, and there was talk of the withdrawal of all the conductors from the service of the company. The ticket then introduced was what is now called the "patent duplex ticket," which is being introduced by "American Duplex Ticket Company," of No. 245 Broadway, New York.

New York, Albany and Troy.

(N. Y. C. & H. R. R. R.)—Form 3.

NO. OF BOOK. 237 NO. OF TICKET. 25

NORTH. / SOUTH.	No. of Book. 237 Am't Paid.	
New York	$0.01	$0.01
Yonkers	0.02	0.02
Tarrytown	0.03	0.03
Sing Sing	0.04	0.04
Peekskill	0.05	0.05
Garrison's	0.10	0.10
Cold Spring	0.15	0.15
Dutch'sJct.	0.25	0.25
Fishkill	0.50	0.50
N.Hamb'gh	0.75	0.75
Po'keepsie	1.00	1.00
H de Park	1.25	1.25
Staatsburg	1.50	1.50
Rhinebeck	1.75	1.75
	2.00	2.00
	3.00	3.00
	3.15	3.15

NEW YORK CENTRAL & HUDSON RIVER R. R.—CASH FARE.

THE PATENT DUPLEX TICKET *must be punched before it is separated*, and this *colored* half given to passenger, must be taken up by Conductor before reaching last station punched. Punch-marks must indicate the Amount Paid; also the stations from and to which traveling, and date.

☞ This Ticket is valid only for a continuous passage on this Day and Train, unless indorsed by the Conductor.

C. H. KENDRICK, Gen'l Ticket Agt

NORTH. / SOUTH.	No. of Ticket. 25 DATE.		
Barrytown	1	17	Jan.
Tivoli	2	18	Feb.
Germantown	3	19	Mar.
Catskill.	4	20	Apr.
Hudson	5	21	May.
Stockport	6	22	June.
Coxsackie	7	23	July.
Stuyvesant	8	24	Aug.
Schodack	9	25	Sept.
Castleton	10	26	Oct.
EastAlb'ny	11	27	Nov.
Albany	12	28	Dec.
Troy	13	29	
	14	30	
	15	31	
	16		

Form 3.

To make as plain as possible the peculiarities of this ticket, we have printed a *fac-simile* of one side of one, as nearly as our printer can imitate it with his types. The wave line on the left and the one about half an inch below the top indicate lines of perforations, and the part above the latter line is the coupon which remains in the book. The number of ticket (here "25") is printed in vermillion, and the central column (over "Form 3") and that next to it on the left, which is a duplicate column of amounts, are covered with a dull red tint, forming a band perpendicularly on the passenger's half of the ticket. In the red band, too, the initials of the road appear in white. But, with the exception of these colors, our copy is pretty exact. These tickets are bound together at the top in little books.

Now the ticket as it is torn from the book is in fact two tickets, back to back, held together slightly by the lines of perforations. The reverse shows the coupon blank, but the rest of the ticket, with the exception of the text in the central column and the red band, is precisely like the passenger's ticket, and each figure and word is just opposite the same figure and word on that ticket, so that a punch through the double ticket removes the same expression on each half. The first cover of the book of tickets, too, is a copy of the passenger's ticket, without the red band and the figures for the ticket number. When the conductor receives a book of tickets, he punches with his proper punch in this cover the name and number of the day of the month from the columns headed "Date," tears off the ticket from the coupon, and gives it to the agent as his receipt for the book; and this receipt is thus complete without a scratch of a pen. If it was January 1, the punch cuts through "Jan." and "1," and the paper thus shows that the conductor who carries such a punch received book 237 on the first of January.

The use of the ticket with the passenger is pretty clear from its face. The punch marks the stations between which the fare is paid, the amount of fare, and the day it is received. The passenger's ticket, therefore, is a legal receipt for a given amount of money, entitling him to a specified journey, and duly dated. The reverse sheet, which the conductor preserves and returns to the agent, with his collections, must be an exact copy of this ticket, and the tickets he returns must indicate exactly how much he has received, and any errors he may have made. His book is thus kept without writing, and his accounts are complete when he has collected all the fares.

The central column in the conductor's part of the ticket reads:

"NEW YORK CENTRAL & HUDSON RIVER R. R.
"NOT GOOD FOR PASSAGE.
"This half of patent duplex ticket is of no value except to the Conductor, who must return it to the office of the company, according to instructions.
"C. H. KENDRICK, General Ticket Agent."

As this is the only check or ticket given to passengers, for long or short distances, the passenger is pretty sure to claim it; and if it is punched at all, he will be apt to take care that it gives him all the ride he has paid for. It prevents overcharging ignorant passengers, which is sometimes done, and the conductor cannot separate the two parts of the ticket and punch them separately without incurring great danger of detection—both by the act of separating the tickets, and by the probability of the two parts being received and compared, which would instantly make apparent any discrepancies.

As to the efficiency of the ticket, both as a system of keeping accounts and a check on overcharging and embezzlements, the companies which have tested it for some time make very strong statements. One road, where an extra charge is charged for fares paid on the cars, and yet a considerable portion of the fares were so paid, since the introduction of the ticket reports that its conductors' collections have fallen off about 75 per cent., while the increase in the sales of tickets has largely swelled the total passenger receipts. It seems that conductors rarely collected the extra charge, though of course they returned the collections in full, so far as they returned any, and that therefore passengers cared little whether they bought tickets at the station or not. The reports, several of which we have seen, are quite uniform and bear the strongest testimony in favor of the device. Quite as strong testimony, perhaps is the rapidity with which it has been introduced on the most careful railroads. Introduced but a few months ago, it has been adopted by the New York & Harlem, the New York Central & Hudson River, the Erie, the Delaware, Lackawanna & Western and all its leased lines, the lines of the Delaware & Hudson Canal Company, the Atlantic & Great Western, the Cleveland, Columbus, Cincinnati & Indianapolis, the Rome, Watertown & Ogdensburg, the Grand Trunk of Canada, the New Jersey Southern, the Flint and Pere Marquette, the Chicago & Michigan Lake Shore, the New Jersey Southern, the Central Pacific, several Southern roads, Wagner's Sleeping Car Lines, and others; so that it has evidently commended itself to a great many railroad officers.

The ticket is also used instead of ordinary station tickets, saving the keeping of a large stock for different stations, as by the present system. Also a form of it is made for extra weight baggage, which gives the passenger a receipt for the extra baggage and the amount paid on it, and prevents overcharging, which is said to be very common with such baggage, the rates on which are not generally known as fares are.

There has been some objection by conductors to this form of ticket, as we have said, on the ground that its use in an imputation on their honesty. We have heretofore treated of this matter, and urged that this class of men cannot possibly suffer by any reasonable system which will make embezzlements as difficult in their business as in ordinary business half so much as they are suffering constantly, good and bad alike, by the character which is popularly ascribed to them, and which is so ascribed to them solely because their occupation gives them unusual opportunities for taking the companies' money with very little danger of detection. Whenever such opportunities exist, some men will take advantage of them, and the class gets a reputation which only a part of its members deserve, but which injures all very nearly alike. When they have no unusual opportunities, people will cease to suspect them.

We understand that the New York Central & Hudson River Company, since adopting this ticket, has increased its conductors' salaries by 25 per cent.

Aside from the direct saving which the stopping of embezzlements may cause, there is another and most important reason for adopting means for putting an end to the practice as far as possible. This is the demoralization of employees caused by the practice. Conductors are naturally a class from which a large part of the officers in charge of the working of roads would be selected; but the bad effect of any suspicion in preventing such promotions, and the worse effect of making a responsible officer, in charge of employees and responsible for purchases or disbursements, of a man who has been guilty of such embezzlements, is easy to see. In the present condition of things it is very hard to maintain a high standard of honor on a railroad, and anything which will help toward it indirectly by lessening opportunities for evil is very much to be desired.

Around the World.

Tickets around the world (for use, not for advertising) have been recently issued by the Union and Central Pacific railroad companies, who have made Mr. W. C. Thompson (for nearly two years past the assistant of Mr. Thomas L. Kimball, the General Passenger and Ticket Agent of the Union Pacific) their "General Foreign Agent," and sent him to London to take charge of the European business, which has become considerable, and seems capable of a considerable extension.

The tickets around the world, copies of which we have been permitted to examine, are in themselves quite a lesson in geography. There are two forms, one by way of New Zealand and Australia, and the other by Japan and China. The one before us is from the east westward, beginning at New York. There are eight coupons, each a little larger than an ordinary banknote, bound together in a thin volume like a music book, with pasteboard covers. The first covers the journey entirely across the continent from New York to San Francisco. Like the rest of them, it is not itself a ticket but is exchangeable for one (by any of the routes to Omaha) on presentation to the general agency of the Union and Central Pacific line in New York. The second coupon is addressed to the agent of the United States, New Zealand & Australia Mail Steamship Company at San Francisco, and is for a passage from San Francisco to Sydney, Australia. The third coupon, addressed to the agent of the Peninsular & Oriental Steam Navigation Company at Sydney, is for a ticket from Sydney, by way of Melbourne, Australia and Point de Galle, Ceylon, to Calcutta, India—a pretty circuitous route, but the only one on which steamers run regularly. The fourth coupon is for a ticket by the East India Railway from Calcutta to Bombay, India. Here a fifth coupon secures the holder a passage in one of the Peninsular & Oriental steamers from Bombay, *via* Suez, to Brindisi, Italy, where a sixth coupon delivers him to the South Italian Railroad Company, which provides him with a ticket to London. The seventh coupon is for a ticket from London to Liverpool, over the London & Northwestern Railway, while the eighth gives a passage by a Cunard steamer from Liverpool to New York, completing the circuit of the globe.

The coupons are good for one year from the date of issue, and cover the transportations of various amounts of baggage, on the different lines—250 lbs. from New York to San Francisco, 20 cubic feet from San Francisco to Australia and from Liverpool to New York, 336 lbs. from Sydney to Calcutta and from Bombay to Brindisi, about 56 lbs. from Calcutta to Bombay, 60 lbs. from Brindisi to London, and 112 lbs. from London to Liverpool.

The cover of the ticket book gives the following table of times and distances:

	Miles.	Days.	Hours.
New York to Omaha	1,391	2	4
Omaha to San Francisco	1,914	4	6
San Francisco to Honolulu	2,100	10	..
Honolulu to Auckland	3,890	14	..
Auckland to Sydney	1,277	5	..
Sydney to Galle	5,230	24	..
Galle to Calcutta	1,315	7	..
Calcutta to Bombay	1,407	2	17
Bombay to Suez	2,972	14	..
Suez to Alexandria	224	..	10
Alexandria to Brindisi	825	6	..
Brindisi to London	1,2 0	3	..
London to Liverpool	200	..	5
Liverpool to New York	3,000	9	..
Total	26,945	101	18

This shows an average progress of about 264 miles per day, or just 11 miles per hour—which is not putting a girdle around the earth in forty minutes, it is true, but is yet a marvelous improvement on the possibilities of a few years ago. The improvement, however, is much greater in the comfort and certainty of the journey than in its speed. The most notable thing is that there are regular lines on all the routes by which these tickets are given, forming the complete circuit of the globe. There is a daily train across this continent, a steamer once in four weeks from San Francisco to New Zealand (leaving every fourth Wednesday, as March 26, April 23, May 21, June 18, etc). On all the other routes the passages are more frequent than on this last.

The route by Japan varies from the Australian route between San Francisco and Calcutta, the Pacific Mail giving a passage from San Francisco to Yokohama, Japan (4,700 miles, in 22 days); the same or the Peninsular & Oriental from Yokohama to Hong Kong, China (1,600 miles in 6 days); the Peninsuler and Oriental from Hong Kong to Calcutta (3,500 miles in 22 days. Thus this route from San Francisco to Calcutta is 9,800 miles long and is traveled in 50 days, while the Australian route is 13,812 miles long and is traversed in 60 days. The former route around the world is thus 4,012 miles and ten days the shortest.

Most of the travel by such tickets must be of tourists, to whom the comfort, certainty and regularity of the journey is of the greatest importance—at least there could never be any considerable amount of such travel until these qualities were secured, as they now are to a reasonable degree. A larger traffic may be expected by the American route from England and Australia, Japan and China. We find these given in a circular of the London agency of the Pacific railroads. By the Cunard steamers they are, from Liverpool to San Francisco, $227 gold; to Yokohama, Japan, $447; to Hong Kong, China,

$527; to Auckland, New Zealand, $409; to Sydney, Australia, $435; to Melbourne, Australia, $456.

So the whole world is becoming familiar, and the out-of-the-way nooks and corners, the most foreign of foreign parts, the countries lately impenetrable because of the wilderness of nature or the savagery or jealousy of man, are found on the highway of the civilized traveler for business or pleasure.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the completion of track on new railroads, as follows:

Houston & Texas Central.—Extended north 20 miles to Denison, Texas, completing the road.

A CONSIDERABLE ERROR was made in an editorial article in the RAILROAD GAZETTE of March 1 on "Rolling-Stock Companies," in the figures intended to show what the rental of the stock of freight cars on the Erie Railway would be at the rates charged by the United States Rolling-Stock Company. The 9,644 cars would incur a rental of $2,169,900, instead of $1,084,950, as stated; and the equivalent capital at 8 per cent. would be $47,266,875 for the entire equipment of the road, instead of $33,705,000, as our article gave it, and the Erie and New York Central & Hudson River, having similar amounts of equipment, would have nearly equal rentals. Since that time the report of the Erie Company for a later year has been received, and the increase of freight cars (772) would add $173,700 to the yearly rental, and $2,171,250 to the equivalent capital.

We are indebted to Mr. Benj. H. Latrobe, of Baltimore, for calling our attention to this error.

THE MEXICAN RAILROAD QUESTION, so far as concerns the projected new lines, is likely to come up at the next session of the National Congress, beginning in April, for determination. The minister having charge of public works has requested the "permanent deputation" of the Congress for the papers necessary to enter into arrangements with Mr. E. L. Plumb, the agent of the International Company, concerning its project for a system of roads, and it is expected that at the approaching session the administration will submit some proposition concerning the matter.

Report of the Chicago, Burlington & Quincy Railroad.

The fiscal year of this company has been heretofore closed with the month of April. The time is now changed—the 31st of December—so that the lease of the Burlington & Missouri River road will begin with the year. The report therefore is for the eight months of 1872, beginning with May.

At the beginning of the period (May 1), the company was working 761½ miles of road. July 23, the extension from Prophetstown to East Clinton, Ill., 17½ miles, was opened, and October 26, the Chicago and Rock River road from Shabbona to Rock Falls, Ill., 46½ miles, making the total at the end of the year 825¼ miles, and the average worked during the eight months 787 miles.

The equipment at the close of the year consisted of 209 locomotives, 25 12-wheel and 62 8-wheel coaches, 1 inspection car, 1 pay car, 15 12-wheel and 29 8-wheel baggage, mail and express cars; 2,716 house, freight and cattle cars; 1,002 platform and coal cars, 89 drovers' and constructors' cars, 40 dump, 3 tool, 1 pile-driving, 282 hand, and 244 rubble cars; and it may be said that probably no American railroad excels this in the quality of its equipment. About one-third of the main track (134.15 miles) is laid with steel rails, 79.22 of which has been laid since May 1, 1872; there is 61½ miles of second track, and the entire permanent way is in the best condition.

The general account shows that this property was represented by the following:

Construction, equipment, cost of branch roads, railroad bonds, stock and materials for future use was..		$41,568,699 99
Capital stock	$18,652 910 00	
Bonded debt, bearing interest	11,346,225 00	
Scrip issued to pay for Northern Cross road from Galesburg to Quincy, not bearing interest	152,250 00	
Amount due bondholders Northern Cross road, as par settlement with them	256,206 95	
Amount of bills and accounts payable over bills and accounts receivable and cash	162,644 18	
Amount contingent liabilities for bonds on branch roads, upon which liability primarily rests	6,756,000 00	
		37,326,236 13
Leaving a surplus of		$4,342,463 86

The earnings for the eight months were:

From passengers	$1,243,321 67	
" freight	3,814 067 13	
" miscellaneous	332,519 91	
" Burlington Bridge	134,822 14	
Total revenue ($7,020 per mile)		$5,524,730 85
The operating expenses for the same period, exclusive of taxes	$3,099,003 51	
Taxes have been, in all	169,782 92	
Total ($4,077 per mile)		$3,208,786 43
Leaving net earnings for the 8 months or $2,943 per mile of road worked.		$2,315,944 43

During the like period of the preceding year, the gross earnings were $5,448,897.13, and the operating expenses $3,226,519.19, showing an increase in the gross earnings over the corresponding months of last year of $75,833.72 (1.39 per cent.), and a decrease in operating expenses of $127,515.68 (3.95 per cent.) The actual net earnings are in excess of those for the same period of the previous year by $203,349.40; but, while the taxes of the year have not been greater, the amount paid during this part of the year was $81,631.28 more than for the like period of the previous year; so that, including taxes paid each year, the increase of net earnings over those of the corresponding period of the previous year is $121,718.12.

The percentage of operating expenses to gross earnings, during the eight months, has been 56 9-100, exclusive of taxes, and, with taxes included, 58 8-100 per cent; while for a like period of the previous year the percentage was 59 21-100 without taxes, and, including taxes, 59 73-100.

The net earnings for the eight months, above expenses and interest on the bonded debt, were equal to $10.41 per share of stock; or, deducting the interest on the bonds of branches which are guaranteed by the company, to $8.80 per share.

The train mileage was:

Passenger	1,027,620
Freight	1,517,271
Miscellaneous	959,074
Total	3,503,965

The passenger report shows:

Number of passengers	1,087,029
Mileage of passengers	40,961 855
Average mileage of passengers	37.68
Average receipt per mile per passenger	$0.0299

The freight statistics show (exclusive of the Illinois Central and Chicago, Dubuque & Minnesota freight hauled in their own cars between Aurora and Chicago):

Total tons moved	1,342 210
Tons moved to or from Chicago	1,005,904
Tons hauled one mile	183,695,032
Average load of loaded cars	9 tons 496 lbs.
Average load of freight cars moved empty and loaded	6 tons 1833 lbs
Average receipt per ton per mile	2.18 cents.

The additions to equipment during the year were 17 locomotives, 4 passenger, 163 freight, 32 platform and coal, 7 drovers' and caboose, 14 hand and 16 rubble cars. The freight equipment is at the rate of 4.64 cars per mile, but is still inadequate, and it is intended to add 500 cars by May next. It is also intended to renew 70 miles of track with steel.

On the lease of the Burlington & Missouri River road at a rental consisting of dividends equal to those paid on the lessee's stock, the values of the two companies' stock were equalized by an issue of $25 per share ($4,663,225 in all) of seven per cent. bonds of the company to its shareholders. Another issue of $1,600,000 of 7 per cent. bonds was made for new construction. The only increase in stock was of 30 shares to a foreign stockholder who had not previously claimed them.

Report of the Erie Railway Company.

The annual report of this company to the State Engineer and Surveyor of New York for the year ending September 30, 1872, has been made, and from this and the report of the preceding year the following comparative statement of the company's property is made.

The following is the road worked by the company:

	Miles.
Main line	459
Branches owned and leased	495
Second track and sidings	319½
Second track or branches	28½
Length of track at stations	157½

This gives a total of 954 miles of road worked by the company, and 1,459½ miles of track. For the preceding year the company reported 914 miles of road, 241½ miles of second track, 234½ miles of side-tracks, and 64½ miles of third rail.

The equipment was for the two years:

	1871-72.	1870-71.
Locomotives	488	475
First-class coaches	258	229
Second-class and emigrant cars	44	51
Baggage, mail and express cars	76	71
*Freight cars	10,638	9,866

*Rated as 8-wheel cars

This shows an increase of 3 per cent. in locomotives, 12½ per cent. in first-class coaches, 7 per cent in baggage, mail and express cars, and nearly 8 per cent in freight cars.

This property was represented by the following:

	1871-72.	1870-71.
Capital Stock	$86,536,910	$86,536,910
Funded Debt	26,395.000	26,398,800
Floating Debt	2,517,301	*none reported
Total	$115,449,211	$112,935,710

*There was probably a large floating debt at this time, but it was not reported.

The construction and equipment accounts were:

	1871-72.	1870-71.
Permanent Way and Structures	$10,751,184.67	$10,468,188.80
Equipment	11,191,473.04	9,860,437.49
Ferries	568,130.83	549,385.15
N. Y. & E. R. R. Co., and Erie Ry. Co. and franchises	86,296,899.72	86,026,350.78
Total	$108,807.687.26	$106,904,362.22
Increase	$1,903,325.04	

The work of the two years was:

	1871-72.	1870 71.
Miles run by passenger trains	3,314,453	3,068,701
Miles run by freight trains	9.004 051	7,511,065
Passenger mileage	156,143,351	142,342 790
Tonnage and mileage	950,703.902	897,446.722
Passengers carried	3 598 988	3,509.462
Tons carried	5,564.274	4,844,208

This is an increase of 8 per cent. in the mileage of passenger trains, and of 20 per cent. in the freight train mileage; of 5½ per cent in the number of passengers carried one mile (passenger mileage), and nearly 6 per cent. in tons carried one mile (tonnage mileage), there having been a larger increase in trains than in traffic. The number of passengers carried was greater by 2½ per cent., and the number of tons by 15 per cent.

The earnings for the two years were:

	1871 72.	1870-71.
Passengers	$3,320,346 84	$3,972,064 70
Freight	14,509,745 47	12,861 999 74
Other sources	542,795 49	333,940 72
Total	$18,371,884 80	$17,168,005 16

Comparing these we find:

Decrease in passenger earnings	$642 717 86, or 16½ per cent.
Increase in freight earnings	1,647.745 73, or 12¾ per cent.
Increase in other earnings	198,854 7., or 59½ per cent.
Increase in total earnings	1,201,879 64, or 7 per cent.

The expenses were:

Transportation expenses	$13,594 504 64
Hudson River Ferry	285 796 43
Operating telegraph	134,918 25
Rents	1,316,890 51
Mileage of foreign cars	398,830 60
Insurance	71,797 90
Miscellaneous (including $139,451.80 for balance of interest)	167,751 37
Total	$14,893.489 73.
Interest on mortgage debt	1,742 554 90
Dividends on preferred stock	597,583 70
Surplus	1,133,260 18
Total	$18,371,887 80

This shows the net earnings to have been $3,473,395.08.

The items of expenses were reported differently for 1870-71, but the totals compare as follows:

1870-71	$15,273,601 61
1771-72	14,898.489 73
Decrease (2½ per cent.)	$374,111 89

And the net earnings are thus compared:

1870-71	$1,895,403 55
1871-72	3,473,395 08
Increase (83 per cent)	$1.577,992 53

The history of the freight tonnage, rates and receipts is shown by the following table, made up from the reports for ten years:

	Tonnage Mileage.	Freight Earnings.	Earnings per ton per mile.
1862-'63	403, 70,861	$8,.32,234	2.09 cents.
1863-'64	432,013.644	9.835.088	2.33 "
1864-'65	388.557.214	10.72 ,.364	2.76 "
1865-'66	478,485,772	11.611 023	2 42 "
1866-'67	549,-84,421	11.304 689	2.04 "
1867-'68	595.699,225	10 780,976	1.81 "
1868-'69	817 829,190	12 583,794	1.54 "
1869-'70	898,862.718	11.983.547	1.33 "
1870-'71	897.446,728	12,864.000	1.43 "
1871-'72	930.708,902	14,509,745	1.53 "

This shows an increase of 135 per cent. in the freight traffic, 74 per cent. in the freight earnings, and a decrease of 27 per cent. in the average rate for carrying freight, since 1862-'63. The rates have been very irregular, but the decrease since the war has been from 2.42 to 1.53 cents—37 per cent.

Of the tons carried, 53.7 per cent. was coal; 19.7 animals, vegetable food and other agricultural products; 18.8 manufactures and merchandise; 5 per cent. "products of the forest," and 2.8 per cent. other articles. The coal was thus more than one-half of the total tonnage carried, though probably not one-half of the traffic, as the average haul for coal is probably less than for other freights. No figures for this are given, however.

Two passengers, 28 employees and 40 others were killed on the road during the year, and 6 passengers, 53 employees and 20 others injured—a total of 70 killed and 81 injured.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—McLene Doherty, Assistant Superintendent of the Logansport, Crawfordsville & Southwestern Railway, having resigned, F. D. Huestis, late Road Master, has been appointed Master of Transportation. He has charge of track, trains, machinery and stations. Employees in these departments report to him at Terre Haute, Ind. Mr. Doherty takes charge of the Continental Freight Line.

—Mr. Charles B. Conde has been appointed Superintendent of the Erie Division of the Lake Shore & Michigan Southern Railway, to succeed William Robinson, resigned.

—The new board of directors of the Quincy, Missouri & Pacific Railroad Company met at West Quincy, Mo., March 7, and elected the following officers: President, C. A. Savage; Vice-President, Joseph G. Rowland; Secretary, George S. King; Treasurer, C. H. Bull; Chief Engineer and General Superintendent, John H. Schermerhorn. Mr. Savage, however, declined the office and tendered his resignation as President and director of the company, whereupon Mr. Ben. E. Smith, President of the Indianapolis, Bloomington & Western Railway Company, was chosen President.

—S. Foster Dewey, Erastus Young, John Q. Howell, Charles J. Osborn, Samuel S. Post, Jr., George Innes and Oakes Ames were elected, March 11, directors of the New Orleans, Mobile & Texas Railroad Company. Oakes Ames is the only one re-elected—or of the board elected a year ago.

—Mr. George Bartle has been appointed Superintendent of Bridges on the New Jersey Division of the New York & Oswego Midland Railroad, in place of Joseph Caverly, resigned.

—Mr. H. P. Aldrich, long Chief Clerk in the office of the Master Car Builder of the Vermont Central Railroad, has been appointed Secretary of the Taunton Car Company.

—At the annual meeting of the St. Louis, Kansas City & Northern Railway Company, at St. Louis, Mo., March 4, the following Board of Directors was elected: Robert E. Carr, Adolphus Meier, James B. Eads, James H. Britton, Lewis B. Parsons, of St. Louis; John J. Mitchell, of Alton, Ill.; T. B. Blackstone, of Chicago; J. N. McCullough, of Pittsburgh, Pa.; Thomas A. Scott, of Philadelphia; Joseph A. Jameson and Solon Humphreys, of New York. The only change is the substitution of L. B. Parsons for W. M. McPherson, deceased. Mr. John. J. Mitchell was subsequently chosen President in place of Mr. Blackstone, who declined re-election.

—At the annual meeting of the Montreal and Plattsburg Railroad Company, at Plattsburgh, N. Y., February 26, John B. Page was re-elected President, John M. Haven, Treasurer, and the old board of directors.

—At the annual meeting of the Quincy, Missouri & Pacific Railroad Company at West Quincy, Mo., March 4, the following board of directors was chosen: C. M. Pomeroy, Thomas Jasper, C. H. Bull, Thomas Redmond, George Adams, Henry Root, Charles A. Savage, Joseph G. Rowland, Amos Green, Quincy, Ill.; M. G. Roseberry, of Maryville, Nodaway County, Mo.; Dr. J. W. Blackburn, of Rockport, Atchison County, Mo.; J. M. De France, of Kirksville, Mo., and A. P. Coggswell, of Brownville, Neb. Messrs. Rowland and Green are new directors, replacing John Wood and P. B. Linnville.

—A circular from the office of the General Manager of the Pennsylvania Railroad announces the following changes:

"Under the revised organization for conducting the business of this company, the railroads owned and operated by the Pennsylvania Railroad Company will be divided into three principal divisions.

"The Pennsylvania Railroad Division will consist of the main line—from Philadelphia to Pittsburg, together with all the branches operated in connection therewith.

"The United Railroads of New Jersey Division will consist of the railroads leased and operated in New Jersey, including the Philadelphia & Trenton Railroad, the Connecting Railroad, and the branches operated in connection with these roads.

"The Philadelphia & Erie Railroad Division will consist of the Philadelphia & Erie Railroad and branches operated in connection therewith, and of the Danville, Hazleton & Wilkesbarre Railroad.

"Mr. G. Clinton Gardner has been appointed General Super

intendent of the Pennsylvania Railroad Division. His office will be at Altoona.

"Mr. F. Wolcott Jackson will continue in charge of the United Railroads of New Jersey Division as General Superintendent, with his office at Jersey City.

"Mr. William A. Baldwin will continue in charge of the Philadelphia & Erie Railroad Division as General Superintendent. His office will, until further notice, be at Erie.

"Mr. Frank Thompson, recently appointed Superintendent of Motive Power, in place of G. Clinton Gardner, appointed as above, will have charge of both the Pennsylvania and the United Railroads of New Jersey Division.

"Mr. Theodore N. Ely has been appointed Superintendent of Motive Power of the Philadelphia & Erie Division.

"Mr. John Reilly will continue Superintendent of Transportation on the Pennsylvania Division, and Mr. C. S. Gauntt is appointed Superintendent of Transportation on the New Jersey Division with office at Trenton, N. J."

Mr. S. B. Kingston, General Freight Agent, also announces the following appointments:

Alex. W. Nuif to be General Freight Agent of the Pennsylvania Railroad Division, office at Philadelphia. John E Houston to be General Freight Agent of the Philadelphia & Erie Division, his office, until further notice, at Erie; Walter Freeman to continue as General Freight Agent of the United Railroads of New Jersey Division, office at Philadelphia.

All these appointments took effect March 1.

—At the annual meeting of the Union Pacific Railroad Company, at Boston, March 5, the following board of directors was elected: Horace F. Clark, of New York; John Duff, of Boston; Augustus Schell, of New York; Oakes Ames, of Easton; Oliver Ames, of Easton; Sidney Dillon, of Council Bluffs; C. S. Bushnell, of New York; Elisha Atkins, of Boston; Royall E. Robbins, of Waltham; F. Gordon Dexter, of Boston; E. H. Baker, of Boston; Joseph Richardson, of New York; George S. Bowdoin, of New York; Frederick Nickerson, of Boston, and O. S Chapman, of Canton, Mass. The board elected Horace F. Clark President, and John Duff Vice-President. The new directors are Messrs. Baker, Richardson, Bowdoin, Nickerson and Chapman, who replace James H. Banker, Levi P. Morton and James Brooks, of New York; G. M. Dodge, of Council Bluffs, and George M. Pullman, of Chicago. The President and Vice-President are re-elected.

—At the annual meeting of the Cleveland, Columbus, Cinnati & Indianapolis Railroad Company at Cleveland, O., March 5, the following board of directors was chosen: P. H. Watson, New York; General Geo. B. McClellan, New York; S. L. M. Barlow, New York; J. J. Cisco, New York; W. B. Duncan, New York; F. Schuchardt, New York; H. E. Parsons, Ashtabula; R. R. Ranney, Cleveland; H. B. Hurlbut. Cleveland; L. M. Hubby, Cleveland; Stillman Witt, Cleveland; T. P. Handy, Cleveland; R. M. Shoemaker, Cincinnati.

Messrs. Hurlbut, Shoemaker, Handy, Witt and Hubby are the only members of the old board re-elected. The new directors are all connected with the Erie or Atlantic & Great Western companies, or both of them.

The board of directors subsequently elected the following executive officers: President, H. B. Hurlbut; Vice-President. H. E. Parsons; General Manager, Oscar Townsend; General Superintendent, E. S. Flint; Secretary and Treasurer, Geo. H. Russell; Auditor, Alfred Ely; Chief Engineer, Frank Ford; General Freight Agent, Lucien Hills; General Ticket Agent, S. F. Pierson.

Mr. Hurlbut becomes President in place of Oscar Townsend, now General Manager, and Mr. Parsons Vice-President in place of Mr. Hurlbut, the other officers remaining unchanged.

It is reported that Mr. Townsend is to be General Manager of the Atlantic & Great Western, as well as of the Cleveland, Columbus, Cincinnati & Indianapolis.

—General N. B. Forrest has been re-elected President of the Selma, Marion & Memphis Railroad Company. Mr. Samuel Tate has been chosen Vice-President, Mr. Henry D. Bulkley Secretary and Treasurer, and Mr. J. B. Fresenius Chief Engineer and General Superintendent.

—The Leavenworth *Times* of the 6th announces that Mr. O. Chanute has resigned his position as Superintendent of the Leavenworth, Lawrence & Galveston Railroad, to take effect on the 15th inst., in order to accept an appointment as Chief Engineer of the Erie Railway. The Erie is to be congratulated on its good fortune.

—Mr. George H. Thayer, for nine years Chief Operator in the general office of the Chicago & Northwestern Railway, has been appointed Superintendent of Telegraph for the road, to succeed Mr. George H. Bliss, whose resignation is noticed elsewhere. Mr. S. E. French, for seven years in the same office with Mr. Thayer, is made Chief Operator.

TRAFFIC AND EARNINGS.

—The following companies have thus far reported earnings for January:

	1873.	1872.	Increase.	Decrease.	P.c.
Chicago & Alton	$402,477	$329,171	$73,306	....	22¼
Clev., Col., Cin. & Ind.	408,849	318,626	90,223	....	28⅜
Erie	1,329,422	1,294,056	35,366	....	2¾
Illinois Central	562,949	527,068	35 881	....	6¾
Marietta & Cincinnati	162,585	142,408	20,177	....	14⅛
Michigan Central	441,863	456,690	....	14,827	3¼
Ohio & Mississippi	286,805	235,980	50,825	....	21½
Pacific, of Missouri	221,382	254,388	...	33,006	13
St. Louis, Alton & Terre Haute	121,868	140,551	....	18,683	13¼
St. Louis & Iron Mountain	163,254	156,292	6,962	....	4½
Toledo, Wabash & W'n	405,110	431,949	....	27,839	6¼

—In the report made by the Pennsylvania Railroad Company to the Auditor General of Pennsylvania, the earnings for 1872 are stated as follows:

Passengers	$4,262,017
Freight	16,856,891
Mails and express	604,542
Miscellaneous	289,073
Total	$22,012,523
Operating expenses (62½ per cent. of earnings)	13,764,673
Net earnings	$8,247,850

The increase in gross earnings over 1871 was $3,292,686, or 17⅞ per cent., and in net earnings $1,351,446, or 19½ per cent. The earnings were at the rate of $31,491 per mile.

—The return of the traffic department of the Union Pacific Railroad Company is as follows:

	December, 1872.	December, 1871.
Earnings	$757,850 92	$469,932 06
Expenses	351,829 23	317,414 30
Net earnings	$406,021 69	$152,517 76
Increase gross earnings for December (61 per cent.)		287,918 86
Increase net earnings for December (166 per cent.)		253,503 93

	1872. Jan. 1 to Dec. 31.	1871. Jan 1 to Dec. 31.
Earnings	$8,892,605 63	$7,521,682 17
Expenses	4,800,579 48	3,600,566 86
Net earnings	$4,092,026 15	$3,921,115 31
Increase gross earnings for 1872 over 1871 (18 per cent.)		$1,370,923 46
Increase net earnings for year 1872 over 1871 (4¼ per cent.)		170,910 84

The gross earnings were at the rate of $8,616 per mile, and the net earnings $3,965 per mile—equaled by few roads so new in the country, and surpassed probably by but one. The net earnings would pay 7 per cent. interest on $56,643 per mile.

—The receipts of the St. Louis & Southeastern Railway for the fourth week of February were $30,475.90, and for the entire month $101,824.78, being $57,116.44 from the St. Louis Division and $44,708.34 from the Nashville Division. The receipts from the St. Louis Division for the month in 1872 and 1873 were:

1873	$57,116 44
1872	37,514 09
Increase (52¼ per cent.)	$19,602 35

PERSONAL.

—Mr. William Denny, an engineman killed on the 4th of February by an accident near Whetham on the Philadelphia & Erie Railroad, was the oldest engineman on the road, and esteemed the best on his division. He had been with the company for ten years, and for the past six had been on the train on which he was killed, making 200 miles daily.

—S. H. Mallory, Chief Engineer of the Burlington & Missouri River Railroad, has resigned his office. The vacancy will not be filled immediately.

—Colonel William C. Alberger has resigned his position as Superintendent of the Buffalo, New York & Philadelphia Railroad. Before leaving the road, Col. Alberger was presented with a silver tea-set, valued at $1,250, by the employees of the company.

—General Alexander S. Diven has resigned his position as Vice-President of the Erie Railway Company, on account of ill-health. Gen. Divon retains his seat in the board of directors.

—Mr. James H. Banker, Treasurer of the Lake Shore & Michigan Southern Railway Company, and a director in most of the Vanderbilt companies, sailed for England on the 5th inst. Mr. Edward D. Worcester, of the New York Central and Hudson River Company, serves as Treasurer in his absence.

—Mr. George H. Bliss, for many years Superintendent of Telegraph of the Chicago & Northwestern Railway, has resigned that position, in order to give his whole time to his private business, as head of the firm of Bliss, Tillotson & Co. (telegraph supplies), of Chicago. Mr. Bliss is counted one of the ablest managers of a railroad telegraph in the country, being at once learned in electrical science and capable in administration.

OLD AND NEW ROADS.

New Jersey Railroad Projects.

The following applications for new charters are now before the Legislature of New Jersey:

The Burlington & Atlantic Company desires to construct a railroad from Tuckerton to the Camden & Atlantic road. This will furnish to the eastern section of Burlington County a much needed connection with Philadelphia. The capital stock will be $200,000, with power to increase to $500,000.

The Haddonfield & Fellowship Company purposes to build a branch road about six miles long from the Camden & Atlantic, near Haddonfield, to Fellowship. Capital stock $400,000.

The Somerset & Atlantic Company wishes to build a railroad from Sandy Hook to some point in Somerset County, and from some other point near the ocean, in Monmouth County, to a connection with any other railroad in New Jersey. The capital stock is to be $500,000.

The New York & Pennsylvania Railroad Company asks for authority to build a railroad from the Delaware River, near Raven Rock, in Hunterdon County, through New Brunswick to a point in Middlesex County near the mouth of Rahway River. This road would be about 50 miles long and the capital stock is to be $2,000,000.

The Delaware & Atlantic Company asks a charter for a road from Sandy Hook west to Frenchtown, in Hunterdon County, a distance of 60 miles, with power to build a bridge across the Delaware. Capital stock $1,500,000.

The Caldwell & Millburn Railroad Company asks for authority to extend its (projected) road from Caldwell north to Sufferns, N. Y., and from Millburn south to New Brunswick. This would increase the length of its projected line from 8 to 53 miles.

The Philadelphia & New York Railroad Company wishes to build a railroad from Jersey City to Camden. The capital stock proposed is $10,000,000, with power to increase to $15,000,000, and the corporators named are Wm. Parry, James Wilson, Thomas N. Adams, John Taylor, Andrew A. Smalley, Adolph Schalk, Jeremiah B. Cleveland and James L. Hayes.

None of these projects are of much importance.

Pittsburg, Virginia & Charleston.

The President of this company reports that $700,000 of the first-mortgage bonds have been negotiated with Speyer & Brothers, of London, and it is hoped the same parties will take the balance of the bonds. The whole issue of bonds is $2,500,000.

Cincinnati & Portsmouth.

The articles of incorporation of this company were filed with the Secretary of State of Ohio, March 1. The road is to run from Cincinnati, a little south of east through Clermont, Brown, Adams and Scioto counties to Portsmouth, 90 miles. The capital stock is to be $500,000 and the corporators are Henry Kemble, Chilton A. White, John Carliste, Benneville Kline, Thos. Ronaldson, Josiah Kirby, Paul Mohr, H. H. Wellman, Z. D. Kile and Jos. Clare.

Mississippi Valley & Western.

The headquarters of this company have been removed from Quincy, Ill., to Keokuk, Ia. A new depot will shortly be built in Keokuk, in which all the general offices will be located.

Delaware & Hudson Canal.

A circular from the president of this company announces that, to provide means for the completion of the line of railroad now under construction on the west shore of Lake Champlain, and for other purposes connected with the extension of the business of the company, the board of managers have decided to issue the remaining 50,000 shares of the capital stock, as authorized by the stockholders at the annual meeting held May 12, 1868. In accordance with the regulations then adopted, there will be apportioned to every person who shall be a stockholder on the first day of April next one share for every three then standing in the name of such person on the books of the company. The stock will be issued at par and will be paid for in cash, in installments, $25 to be paid April 15, $20 July 15, $20 October 15, $20 January 15, 1874, and $15 July 15, 1874.

Interest will be allowed at the rate of 7 per cent. per annum upon installments, and parties may take full paid stock and be allowed interest from date of payment to August 1, and be thereafter entitled to a participation in dividends.

A failure to pay first installment will be regarded as a refusal on the part of the stockholders to avail of the privilege offered, and the nonpayment of any subsequent installment will involve the forfeiture of the stock and of all that may have been previously paid on account thereof.

The transfer books of the company will be closed from the evening of March 31 to the morning of April 15.

The present capital stock is $15,000,000, and the proposed increase of $5,000,000 will raise it to $20,000,000. Sales of the stock were made March 5 at $122 per share. The bonded debt of the company is $10,000,000. The company owns a canal from Honesdale, Pa., to Eddyville, N. Y., 108 miles long, and a railroad from Scranton to Honesdale, Pa., 45 miles, and operates under lease the Albany & Susquehanna and the Rensselaer & Saratoga railroads. It is also constructing a railroad from Whitehall to Plattsburg, along the west shore of Lake Champlain.

Houston & Texas Central.

A correspondent writes from Dallas, Tex, that on the 1st inst. the track of this road was laid and regular trains were running as far north as Sherman, which is within nine miles of Denison, where the road will connect with the Missouri, Kansas & Texas, and this gap was all graded and trains were to be running within a week.

A dispatch dated March 11 reports that the last rail of this road was laid on that date, completing the road to a connection with the Missouri, Kansas & Texas at Denison, Texas.

International & Great Northern.

A corps of engineers is locating a line for a road between Troupe, on the Great Northern, and Bunham, on the International.

Texas & Pacific.

A correspondent on this road writes us that five boats loaded with iron for this road have reached Shreveport, La., and that the laying of track from Longview westward has been begun, and also on the branch from Marshall north to Jefferson, Texas. An engineer corps is in the field re-locating the line of the North Louisiana & Texas Railroad between Shreveport and Munroe, La., from which latter point the road is completed to Vicksburg.

Springfield & Long Meadow.

The city of Springfield, Mass., some years ago voted $400,000 to this road, in order to secure a railroad connection over it with the New London Northern road, but the road was never built. It is now proposed to build the road from Springfield to the Connecticut, line there to connect with the Connecticut Central road which is to be built from Hartford through East Windsor and Infield to the State line. The company asks for a renewal of the grant, though the original object of the road has been changed,

Union Pacific.

The trustees of the land bonds will receive proposals for the sale to them of $50,000 of the land bonds, in accordance with the provisions of the mortgages, until March 20. The bids will be opened the next day.

Dividends.

The New York Central & Hudson River divide 4 per cent. for the half year, payable April 15 at the office of Duncan, Sherman & Co. The same dividend will be paid on the outstanding "consolidation" certificates at the same time, by the Union Trust Company. Transfer books will be closed March 15, and reopened April 19.

New York, Westchester & Boston.

New England papers say: "Harris Brothers & Co. (B. D. & F. W. Harris), of Brattleborough, have closed a contract to build the New York, Westchester & Boston Railroad from the Harlem River to the Connecticut State line at Portchester—a distance of about 21 miles. It is to be a first-class, double-track road, with iron bridges and steel rails, and is to be completed within twelve or eighteen months, as the company may elect. The work and material covered by this contract—superstructure not included—exceed $1,000,000. At Portchester this road will have northern connection with the Ridgefield, Danbury & Housatonic roads, and with the Boston Air-line by a new road to New Haven, which will be located far enough from Long Island Sound to avoid all draw-bridges."

Erie.

This company will receive proposals until the 17th inst. for the supply of 1,000 kegs, more or less, of square and hexagon nuts, cold and hot pressed, and for 50 tons, more or less, of cast steel for tools, and frog steel in bars, plates and points. L. L. Lockwood, the Purchasing Agent, whose office is at No. 309 West Twenty-third street, will give information as to details.

Mexican.

This English company, which has recently completed and put into operation its great line from Vera Cruz to Mexico, has made arrangements for the acquisition of the mule railroad from Vera Cruz to Jalapa, from the company owning it.

Pittsburgh, Fort Wayne & Chicago.

The annual meeting will be held at the company's office, No. 167½ Wood street, Pittsburgh, at noon, on the 19th inst., for the election of three directors.

New Orleans, Mobile & Texas.

The company reports that a force of 2,000 men is at work on the line, that a bridge 300 feet long over Grand River, La., has just been completed, and that 20 miles of grading has been completed between that point and Vermillionville.

New York Central & Hudson River.

On the evening of the 8th Mr. J. M. Bailey, United States Collector of Internal Revenue, seized 17 locomotives of this company in the round-house at West Albany, for non-payment of the revenue tax on the scrip dividend, which was assessed some two years ago, but which the company contend is illegal. The tax amounts to $460,000.

Boston & Maine.

Regular passenger trains are to begin running through from Boston to Portland over the new Portland Extension of this road next Monday.

Maine Central.

The board of directors of this company has voted to transfer the general offices from Augusta, Me., to Portland, a change proposed some time ago. The transfer will be made as soon as suitable accommodations in Portland can be obtained.

Canada Southern.

A dispatch from Detroit, Mich., says: "The Canada Southern Railway Company have determined to tunnel under the Detroit River at Trenton, and have already commenced operations. They have sunk a shaft on Stony Island and are working on it with all the men that can be employed. The indications are that the tunnel will be run through a bed of limestone rock the whole distance. The shaft has already been sunk into a stratum of such rock."

Pennsylvania & Delaware.

It is stated that the directors of the Pennsylvania Railroad Company have notified the officers of this company that the recent arrangement with the Wilmington & Western Company were not satisfactory and could not go into effect. No information, however, has been received by the latter company.

Resolutions have been passed by the board of directors, consolidating the company with the Delaware & Pennsylvania Company, which is building the Delaware end of the road.

Eastern, of Massachusetts.

This company now receives freight for the East, in Boston, at the Lowell freight-house, as well as at East Boston.

Cayuga Lake.

The opening of this road was celebrated recently by an excursion from Philadelphia over the North Pennsylvania, Lehigh

Valley, Ithaca & Athens and Cayuga Lake roads. The Cayuga Lake road, with the Ithaca & Athens, forms an extension of the Lehigh Valley from Waverley, N. Y., to the line of the New York Central. It is expected to carry a large coal traffic.

Bucksport & Bangor.

The stockholders of this company (formerly the Penobscot & Union River) have accepted the amended charter recently passed by the Legislature. The contract for the construction of the road from Bangor, Me., south to Bucksport, about 20 miles, has been let to John E. Gowan for $550,000, the work to be completed during the present year.

Memphis, Pine Bluffs & Shreveport.

The directors of this company have resolved to build the road of 4 feet 8½ inches gauge, and to locate the road with special reference to the connection with the Texas & Pacific at Shreveport.

Cleveland, Columbus, Cincinnati & Indianapolis.

The recent election of directors of this company resulted in the choice of a board of directors the majority of whom are in the interest of the Atlantic & Great Western and Erie Companies. At the first meeting of the new board a call was issued for a special meeting of the stockholders to be held at Cleveland, April 16, to vote upon the question of leasing the road to the Atlantic & Great Western Company, and also upon the question of authorizing the directors to increase the capital stock by issueing $5,000,000 of new stock.

The transfer books are to be closed from April 5 to April 17.

Boston & Lowell.

This company has been served with a writ of attachment prohibiting the paying of any moneys now in their hands, and due to the trustees and managers of the Vermont Central Railroad Company. The writ is understood to have been drawn at the instance of the Ogdensburg & Lake Champlain Railroad Company.

Boston & Providence.

The stockholders of this company and the Stoughton Branch Company held meetings in Boston, March 4, and voted to accept the act recently passed by the Legislature authorizing the consolidation of the companies. The Boston & Providence stockholders authorized an issue of $1,000,000 in bonds in payment for the Stoughton Branch. The latter corporation is to be dissolved.

The President of the Boston & Providence Company stated that the road had now purchased a controlling interest in the Providence, Warren & Bristol and the Fall River, Warren & Providence, thus securing the control of the greatest coal depot in New England. The road also intends getting control of the Stonington road and establishing a line between Providence and Fall River with the co-operation of the Old Colony.

Middleborough & Taunton.

It is reported that the Old Colony Railroad Company has offered to purchase this road for $175,000. The road, which is 8½ miles long, extends from Middleborough, Mass., the Junction of the Old Colony and Cape Cod railroads, west to Weir Junction on the New Bedford & Taunton road, one and one-half miles from Taunton.

Montreal & Plattsburgh.

The proposed consolidation with the New York & Canada Railroad has been approved by the board of directors, and a meeting of the stockholders to vote on the question was called, to be held April 3 next.

Westchester & Philadelphia.

It has been rumored for some time that this road is shortly to be sold. The road extends from Philadelphia southwest 27 miles to Westchester, and the company possesses a charter to extend it southward to Peach Bottom, a point on the Susquehanna River. The Wilmington (Del.) *Gazette* says: "It is said that the Baltimore & Ohio Company want it in order that they may run to a direct terminus in Philadelphia. The Philadelphia, Wilmington & Baltimore Company are also, it is said, anxious to gain possession of it. The Reading is alleged to be after it, as they want it for the distribution of coal southward. Last comes the Pennsylvania Railroad, who desire it for a through line between New York and the national capital.

St. Louis & Western.

This is the name of a company which proposes to build a railroad of three-feet gauge from St. Louis west to Leavenworth, Kan., about 300 miles.

ANNUAL REPORTS.

East Tennessee, Virginia & Georgia.

The annual report of the directors of this company refers mainly to the settlement of the difficulties between the company and the United States Government, and to the arrangements made for the extension of the connections of the road.

At the close of the war the Government sold to the two companies afterwards consolidated into this company rolling-stock and material to the amount of $725,000, for which bonds bearing 7.30 per cent. interest were given. The interest on these bonds was partly paid by credits on mail and other Government transportation, and suit was brought for the balance. Counter-claims for property taken or destroyed by the Government were set up, and the matter was finally compromised by the company giving its second-mortgage bonds for $190,000, one-half payable in ten and one-half in fifteen years from January 1, 1872, and bearing 4 per cent. interest. The sum of $5,000 in cash was also paid. The expenses of this suit were very heavy, amounting to about $53,000.

During the year the Rogersville & Jefferson and the Cincinnati, Cumberland Gap & Charleston roads were sold under foreclosure of the lien held by the State of Tennessee. The former road, 16 miles long, was purchased by the company for $15,548.91, and the latter, 39 miles long, was bought for $214,-175.43 by C. M. Malyhee and R. T. Wilson, to be held by them for the company until the connection between the road and the Western North Carolina can be completed.

Contracts have also been made under which the company agrees to pay $100,000 to R. Y. McAden for his interest in the Western North Carolina road and a further sum of $100,000 for $1,057,000 in bonds of that company. It is believed that these contracts and payments will secure a complete title to the Western North Carolina road, and the Western Division of the North Carolina Railroad, subject, however to a prior lien of $270,000. The $200,000 advanced by the East Tennessee, Virginia & Georgia Company is fully secured by a lien on the property. The Western North Carolina road is now completed from Salisbury, N. C., to Old Fort, 114 miles, and is nearly graded to Asheville, 16 miles further. It is believed that with proper aid the road can be completed without delay through the mountains to Morristown, Tenn., the terminus of the Cincinnati, Cumberland Gap & Charleston road, and that it cannot fail to become a valuable property in itself and a valuable connection of the East Tennessee, Virginia & Georgia.

Lehigh Valley.

This road extends from Easton, Pa., to Wilkesbarre, 101 miles, with branches from Penn Haven to Hazleton and Milnsville, 38 miles, from Penn Haven to Audenried, 17 miles, from Black Creek to Mount Carmel, 41 miles, and a number of short coal branches, making a total mileage of 233.38. Of this 89.35 is double track, and there is 133.35 miles of sidings. During the year 15 82 miles of sidings and coal branches have been laid. The road is extended from Wilkesbarre to Waverly, N. Y., on the Erie road, by the Pennsylvania & New York Railroad, which though substantially owned by the Lehigh Valley Company, is worked by a distinct corporation and makes separate reports.

The receipts from transportation and the expenses, including general expenses and taxes, for the year ending November 30, 1872, were as follows:

	Gross receipts.	Expenses.	Net earnings
Passengers, express and mails	$169,510 75	$311,264 58	$158,246 17
Freight	1,262,701 15	774,177 75	488,531 40
Coal	4,250,729 58	2,784,244 65	1,466,484 93
Total	$5,982,919 48	$3,869,686 98	$2,113,262 50
For preceding year	5,290,724 65	3,462,029 78	1 828,694 87
Increase in 1873	$692,224 83	$407,657 20	$284,567 63

Showing an increase in gross earnings of 13 per cent., in expenses of 11¾ per cent., and in net earnings of 15½ per cent. The expenses for 1872 were 64⅔ per cent. of the gross earnings, and the gross earnings were at the rate of $25,678 per mile. Each branch of the transportation was much heavier than in the preceding year, but the receipts do not show a corresponding increase, as the rates for the year were much lower. The receipts from coal lands, interest on investments, etc., were $451,965,81, making the total receipts of the company $6,434,-915.29

The total tonnage of anthracite coal during the year was 3,850,118 tons, as against 2,781,509 tons the preceding year, showing an increase of 1,068,609 tons, or 38½ per cent. The number of tons of coal carried one mile was 211,939,494, an increase of 58,212,944, or 31 per cent. The average freight per ton per mile was 275-1000 of 1 per cent. less than for the preceding year. There was a large increase in the local coal traffic, caused mainly by the increased production of pig iron along the line. The coal carried was from the following sources:

Wyoming Region	508,953 tons.
Hazleton Region	2,192,877 tons.
Upper Lehigh	3,090 tons.
Beaver Meadow	756,564 tons.
Mahanoy	388,971 tons.
Mauch Chunk	2,683 tons.
Total	3,850,118 tons.

The general freight transported amounted to 1,995,472 tons, equivalent to 62,994,752 tons carried one mile, an increase of 18½ per cent. over the previous year. The average receipts per ton per mile were 2 cents, against 2.14 cents the previous year. During the year 967,850 passengers were carried, equal to 14,843,285 carried one mile, an increase of 10⅜ per cent., but the average amount received per passenger per mile was 33-100 of 1 per cent. less than during the preceding year. The passenger receipts show a very small reduction, notwithstanding the increase in number of passengers, but increased receipts from mail and express show a total increase in passenger train receipts of $4,454.06, or 1 per cent. The increase in freight receipts was $124,508.02, or 10⅛ per cent, and in coal receipts, $563,262.75, or 15½ per cent.

During the year 30.33 miles of track was relaid with steel rails, making in all 62.79 miles of track laid with steel now in use. During the year $480,701.38 was expended for new rails and joint plates, and $67,755.05 for frogs, switches, spikes, bolts, etc. These amounts, with $21,228.89 expended for new bridges, $35,360.85 for station houses and water tanks, and $44,492.44 for new engine houses, shops and shop tools were charged to expenses. The sum of $104,528.64 for the construction of new coal branches and side tracks was added to construction account. Twelve locomotives, four passenger, four baggage, one wrecking, four caboose, 64 gondola and 1,642 coal cars were built or purchased during the year, making the total equipment at the end of the year, 181 locomotives, 44 passenger, 25 baggage, 200 box, 713 platform and gondola, 44 lime and 15,696 coal cars, the last rated as four-wheel cars. There are also 18 caboose, 69 gravel and nine wrecking and tool cars.

The new issue of stock authorized in March last at the rate of one share to every three shares outstanding has all been taken by the stockholders. Of the old Lehigh Valley bonds due in 1873, $227,000 has been redeemed. For those now outstanding the new 6 per cent. registered bonds will be exchanged. Of these $920,000 still remain unissued. At the close of the fiscal year the capital account was as follows:

Preferred and common stock (439,376 shares)	$21,468,600
Scrip for installments paid on new stock	70,830
Hazleton Coal Company bonds overdue	3,000
Bonds due in 1873	703,000
Six per cent. bonds, due in 1898	4,048,000
Seven per cent. registered bonds, due 1910	5,000,000
Total	$31,923 630

This capital account is at the rate of $137,011 per mile. There is no floating debt. The usual quarterly dividends, amounting to 10 per cent., were paid during the year.

The construction of the Easton & Amboy road, which is to extend the Lehigh Valley road to tide-water at Perth Amboy, N. J., is progressing well, about $550,000 having been already expended. The stock of this company has all been taken by the Lehigh Valley Company.

The interest in coal lands has been increased by the purchase of the Delano tract near Mahanoy City, comprising 5,800 acres, on which are 12 collieries. The consideration was $2,000,000, of which $100,000 was paid in cash and $1,900,000 in bonds of the Delano Land Company, to be indorsed by the Lehigh Valley Railroad Company.

Chicago, Danville & Vincennes.

This company has recently issued a circular, giving briefly a report of the operations of the year. The road worked by the company, from Chicago south to Danville, Ill., is 132 miles long, 112 of which is owned by the company, while the use of the 20 miles from Chicago to Dalton is leased from the Columbus, Chicago & Indiana Central Company. The equipment at the close of 1872 consisted of 24 locomotives, 17 passenger and baggage cars, and 780 8-wheel freight cars. There were also 10 locomotives and 450 freight cars in course of construction for early delivery.

The receipts for 1872 were:

Local freight	$278,576 40
Foreign freight	224,845 71
Local passenger	83,127 82
Foreign passenger	8,705 89
Mail, express and miscellaneous	32,673 50
Total	$627,930 32
The working expenses were (56 per cent.)	350,077 54
Leaving net earnings	277,852 78

The working expenses include rents, taxes, etc.

The monthly receipts show a progressive and nearly regular increase from the beginning to the end of the year, the lowest having been in January ($41,559), the average having been $52,308, and the receipts for each month since July having exceeded the average.

The gross receipts have been at the rate of $4,757 per mile, and the net earnings $2,105 per mile. The interest on the bonded debt is about $1,941 per mile, leaving a surplus for this the first full year of the working of the road of $613 per mile.

The company have contracts for coal transportation, as soon as the Fountain County mines are reached by the branch now partly completed, which will give it at least 500 tons per day. Two miles of track will complete this branch to the mines. The branch to Brazil, Ind., can be completed by midsummer, and the company has the means to do it.

The officers believe that, with the new equipment now under contract, the road will be able to earn at least $100,000 per month.

LOCOMOTIVE RETURNS, OCTOBER, 1872.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

Name of Road.	Number of miles operated	Number of Locomotives in service	Mileage. Passenger	Freight	Miscellaneous	Total	No. of Miles run to Ton of Coal	Cord of Wood	Pint of Oil	Cost per Mile, in Cents. Repairs	Fuel	Stores	Miscellaneous	Engineers, firemen and wipers	Total	Average Cost of Coal, per ton	Wood, per cord	Oil, per gallon
																$	$	$
Burlington & Missouri River		68	55,428	107,920	57,613	220,961	36.19	49.63	14.85	4.63	7.13	0.59	....	7.68	20.03	2.80	4.00	....
California Pacific	143	12	14,946	10,771	3,850	29,567	.....	40.94	15.38	4.98	12.21	0.91	....	6.18	24.28	.....	5.00	....
Central Pacific (Western Division)	173.4	44	39,416	55,293	30,060	124,769	45.63	.....	13.63	11.15	26.80	0.97	....	6.52	45.44	12.19	5.00	....
" " (Sacramento Div.)	119.5	36	14,197	49,677	28,247	85,031	.....	33.56	14.47	10.53	11.92	0.98	....	7.66	20.47	.....	4.00	....
" " (Truckee Div.)	204.8	26	13,450	43,897	7,300	63,457	35.27	35.29	13.63	9.45	19.42	0.98	....	7.99	37.84	9.25	4.00	....
" " (Humboldt Div.)	226.6	21	15,195	35,866	5,021	56,073	40.99	.....	12.22	10.09	17.54	1.09	....	6.97	35.62	7.00	6.00	....
" " (Salt Lake Div.)	112.8	20	11,464	42,770	6,200	60,434	42.19	.....	12.46	9.54	12.44	1.03	....	6.77	29.78	5.00	9.00	....
" " (Oregon Div.)	151.5	7	11,482	8,130	2,750	22,362	.....	41.86	21.36	2.85	11.92	0.66	....	7.22	22.65	.....	5.00	....
" " (Visalia Div.)	146.3	16	11,260	10,220	6,868	28,348	68.42	.....	15.58	8.20	17.53	0.85	....	6.36	32.94	12.17	5.00	....
Chicago & N. W. (Wis. & Mil. Div.)	.....	84	73,258	97,998	53,896	225,142	30.77	.....	.....	8.14	13.35	0.92	....	8.20	30.61	3.50	4.75	....
" " (Madison Div.)	.....	16	9,146	20,971	13,659	43,776	29.52	.....	.....	8.74	15.53	0.90	....	7.78	32.95	3.50	4.75	....
" " (Galena Div.)	.....	72	56,823	93,692	40,977	191,492	32.46	.....	.....	8.02	11.19	1.02	....	8.87	29.10	3.50	4.75	....
" " (Iowa Div.)	.....	71	44,674	97,276	33,309	175,259	29.34	.....	.....	5.75	12.27	0.90	....	8.16	27.08	3.50	4.75	....
" " (Peninsula Div.)	.....	24	2,166	40,117	45,049	87,332	43.31	.....	.....	1.39	10.24	0.64	....	5.91	18.18	3.50	4.75	....
Chicago, Rk. Isl. & Pacific (Ill. Div.)	.....	76	38,771	148,723	5,136	192,630	40.54	.....	18.36	4.20	7.00	0.55	....	6.88	18.63	2.75	4.00	....
" " " " (Iowa Div.)	.....	108	76,297	168,295	44,649	289,151	40.00	.....	14.93	3.27	7.05	0.62	....	6.61	17.55	2.75	4.00	....
Clev., Col., Cin. & Indian. (Ind. D.)	207	58	27,584	32,017	36,840	196,391	43.47	.....	20.37	4.40	6.21	0.59	....	7.87	19.07	2.70	.....	.....
" " " " (Col. Div.)	138	47	26,956	67,304	42,225	136,485	46.12	.....	22.26	3.71	5.84	0.73	....	7.00	17.27	2.70	.....	.....
" " " " (Cin. Div)	139	26	18,627	26,060	32,797	77,554	45.02	.....	19.24	5.26	6.00	0.66	....	6.85	18.87	2.70	.....	.....
Cleveland & Pittsburgh	.....	83	.....	.....	.....	222,638	53.33	.....	19.09	7.83	5.17	0.73	....	7.09	20.82	2.25	1.95	....
Denver Pacific	.....	.....	9,512	4,432	4,065	18,009	59.45	.....	21.85	2.97	5.76	0.43	....	5.95	15.11	3.50	6.35	....
Flint & Pere Marquette	.....	31	22,111	24,781	23,205	70,097	.....	55.33	40.95	3.50	8.13	0.90	....	7.37	19.90	.....	4.50	....
Hannibal & St. Joseph	.....	65	34,170	102,526	33,070	169,766	46.70	.....	20.10	6.90	6.00	0.90	....	7.40	21.20	2.50	5.00	....
Illinois Central (Chicago Division)	257.56	66	43,864	90,762	37,717	172,343	41.15	.....	12.40	8.14	5.09	0.68	....	5.84	20.75	1.90	4.30	0.50
" " (South Division)	240.75	35	26,770	61,421	12,728	99,920	35.20	.....	11.73	7.37	5.77	0.75	....	6.65	20.54	1.90	4.30	0.50
" " (North Division)	222	43	22,905	85,868	14,890	120,663	38.98	.....	11.73	6.21	6.90	0.73	....	6.60	22.44	1.90	4.30	0.50
" " (Iowa Division)	401	45	27,624	92,936	15,701	136,261	32.14	.....	12.53	6.79	8.00	0.57	....	6.08	21.52	2.50	5.50	0.50
Kansas Pacific	.....	.....	57,041	129,354	45,298	231,693	37.01	.....	12.61	5.61	10.57	0.70	....	7.13	24.31	4.00	3.24	....
Lake Sh. & Mich. Sou. (Buffalo Div.)*	.....	83	24,320	117,460	83,090	224,870	49.80	.....	14.00	5.00	7.00	.....	....	6.60	18.60	3.50	3.50	....
" " " " (Erie Div.)*	.....	90	40,372	147,201	63,692	251,265	42.51	48.24	15.85	4.29	8.23	.....	....	7.06	19.58	3.50	4.00	....
" " " " (Toledo Div.)*	.....	76	41,260	122,750	38,500	212,510	48.71	55.07	14.73	3.25	7.93	.....	....	6.90	18.08	4.00	4.00	....
" " " " (Mi.So. Div.)*	.....	163	125,922	212,325	170,104	508,261	34.23	45.43	19.22	5.38	8.79	.....	....	5.98	20.15	4.50	3.50	....
																p. bu.		
Louisville & Nashv. (Main Line)	356	93	70,681	133,090	6,783	210,524	33.04	.....	19.30	7.12	14.25	0.74	0.63	9.30	32.04	0.15	3.25	0.31
" " (Clarksville Div.)	138.4	6	.....	7,468	1,980	9,343	.....	17.90	11.00	.....	.....	.....	.....	.....	.....	.....	2.65	0.31
" " (Memphis Div.)	270.4	21	20,313	32,778	3,214	56,805	.....	33.00	12.40	3.97	10.42	0.74	1.10	9.21	25.44	.....	3.25	0.31
" " (Decatur Div.)	122	26	18,300	19,409	1,136	39,845	.....	.....	11.20	6.63	10.82	0.57	0.57	10.29	29.20	0.15	3.50	0.31
" " (S. & N. Ala. D.)	193	30	28,815	23,536	3,756	54,101	35.00	.....	9.30	4.93	6.05	1.14	1.58	8.30	22.00	0.15	.....	0.31
																p. ton		
Leavenworth, Lawrence & Galveston	.....	16	17,526	19,061	3,381	39,968	64.99	.....	29.21	1.85	5.68	0.48	....	7.51	15.32	3.50	2.50	....
Marquette, Houghton & Ontonagon	.....	17	.....	.....	.....	47,132	69.98	.....	17.40	6.37	8.41	0.83	1.95	6.15	23.71	4.25	4.50	....
																p. bu.		
Pennsylvania (New York Division)	.....	103	140,800	103,234	10,328	254,362	30.70	37.74	8.93	7.00	13.10	1.40	.....	.....	21.50	0.16	6.24	....
" (Amboy Division)	.....	56	54,335	48,755	5,593	108,683	48.99	55.56	13.81	6.50	10.40	1.10	.....	.....	18.00	0.16	6.24	....
" (Belvidere Division)	.....	31	21,023	31,533	4,469	57,025	44.14	53.19	14.49	7.00	11.30	1.20	.....	.....	19.50	0.16	6.24	....
" (Philadelphia Div.)	.....	131	73,960	261,811	11,794	349,265	31.40	.....	16.89	5.10	6.90	0.90	.....	.....	12.90	0.07	3.76	....
" (Middle Division)	.....	118	68,511	275,336	13,823	357,270	29.20	.....	21.27	4.70	7.20	0.70	.....	.....	12.60	0.07	3.76	....
" (Pittsb'g Div., E. End.)	.....	60	11,277	153,756	4,031	169,064	23.14	.....	11.99	5.90	5.90	1.10	.....	.....	15.90	0.07	3.76	....
" (Pittsb'g Div., W. End.)	.....	113	71,044	190,667	9,553	271,264	34.01	.....	15.87	6.30	6.30	0.80	.....	.....	13.40	0.07	3.76	....
" (Tyrone Division)	.....	39	11,555	36,272	3,238	51,115	29.59	.....	23.93	8.69	7.30	0.80	.....	.....	16.70	0.07	3.76	....
" (West Penn'a Div.)	.....	27	16,945	38,503	4,156	59,604	37.90	.....	30.49	6.00	5.60	0.50	.....	.....	12.10	0.07	3.77	....
" (Lewistown Division)	.....	10	7,450	9,753	1,107	18,310	45.63	.....	18.32	9.00	4.60	0.90	.....	.....	14.50	0.07	3.77	....
" (Bedford Division)	.....	7	3,230	4,055	1,591	3,926	78.62	.....	22.32	18.90	3.00	0.50	.....	.....	22.40	0.07	3.77	....
																p. ton		
Pittsb'g, Ft. Wayne & Chic. (E. Div.)	319.2	150	86,680	335,591	12,893	434,564	39.08	.....	14.81	2.42	6.64	0.87	1.09	7.09	18.17	2.50	3.20	....
" " " " (W. Div.)	280	99	86,719	194,001	19,936	300,656	61.10	27.20	17.50	2.40	10.30	0.50	....	6.90	20.10	2.55	3.25	....
San Francisco & North Pacific	38	3	4,065	3,420	1,460	8,945	.....	41.80	17.57	3.57	11.96	0.77	....	5.40	21.70	.....	5.00	....
South Carolina	.....	37	14,459	55,197	14,307	83,963	.....	43.42	30.49	6.67	5.42	0.73	....	....	12.82	.....	3.35	....

* Switching Engines allowed six miles per hour

† 0.90 lbs. sand used per mile run.